THE ENGINEERING AND MINING JOURNAL.

WITH WHICH IS INCORPORATED

THE COAL AND IRON RECORD.

VOL. XX.—No. 20. NEW YORK, SATURDAY, NOVEMBER 20, 1875. PRICE 10 CENTS PER COPY.

THE ENGINEERING AND MINING JOURNAL

Is devoted to MINING, METALLURGY, GAS MAKING and ENGINEERING.

It is the only paper officially authorized to publish the proceedings, transactions, and bulletins, of the American Institute of Mining Engineers, including all the valuable papers read before that influential society.

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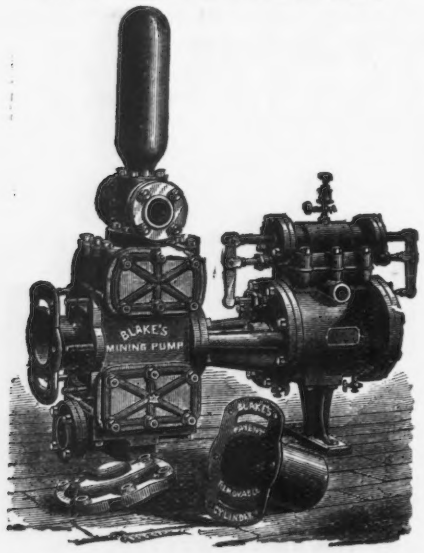

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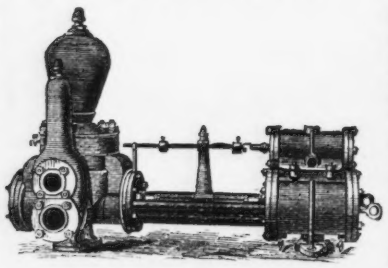

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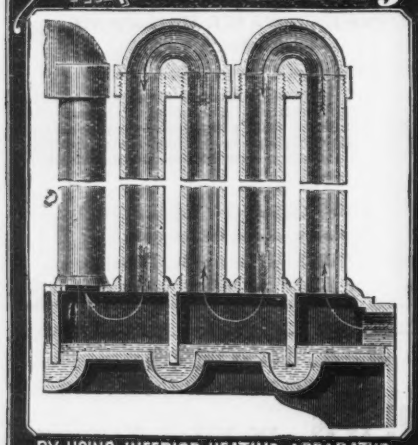

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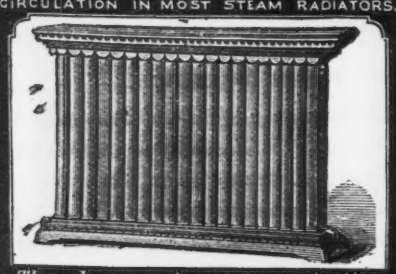

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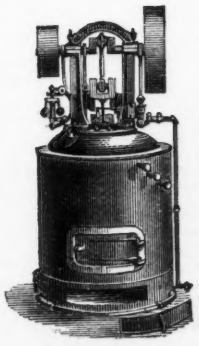

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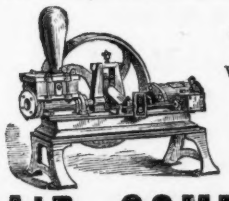

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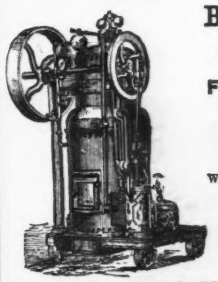

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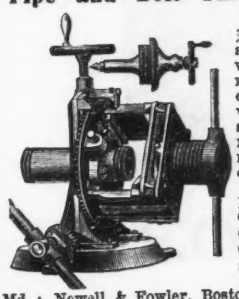

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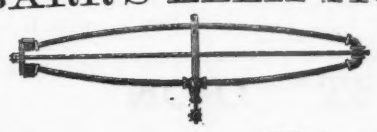

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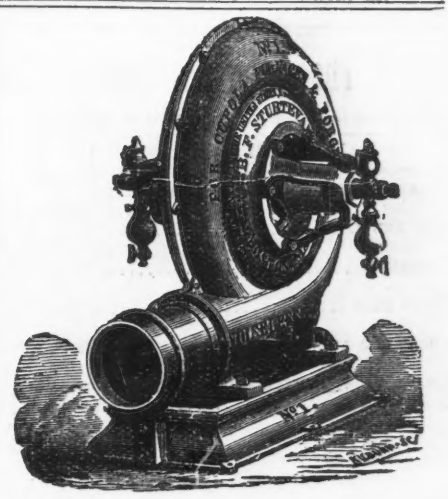

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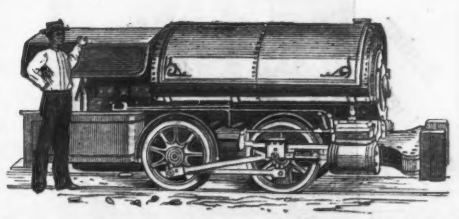

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(See Prof. WURTZ's Report this Number.)

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THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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Improvements in Gas Manufacture.

There are few industries, in any civilized country, that absorb so large an amount of capital as that of gas making. So large indeed, is this amount, that open competition is practically impossible except in very large cities ; and gas companies in almost all cases enjoy a monopoly more absolute than any other industry, supplying the public with an article of absolute necessity. With none of the wholesome stimulus which comes from competition and rivalry, it is certainly not to be wondered at, that the typical gas manufacturer is remarkable, rather for complacent conservatism, than for progress or brilliant discovery. When the waste and extravagance, which are the products of ignorance or incapacity, can be made up by a simple increase in the price of gas to consumers—who are powerless to prevent it—there is certainly little inducement to study economy, which may come, either by the introduction of improvements in methods of manufacture, or by the saving of waste, which would result from a more familiar knowledge of the chemistry of gas manufacture and purification.

Now and then, it is true, some valuable practical improvement is discovered, more generally by accident than design; but the *why* and the *wherefore* in every step of the manufacture, receive far too little attention at the hands of our gas-works managers. That there are many really able and well-qualified men among them, does not invalidate the general truth of the statement, that there is, probably, no manufacturing business, involving anything like so large an amount of capital, that is conducted so entirely by "the rule of thumb," and with so little regard to the teaching of science, as is the making of illuminating gas to-day. The time has fully come when a thorough scientific, as well as practical knowledge of the nature and requirements of a good illuminating gas, and of the chemistry of its manufacture, should be considered a more essential qualification in the manager of a gas works, than relationship with the President, or some influential person on the Board of Directors, or the vouched-for "good character" that "he will not try experiments."

As the public becomes more and more familiar with the extraordinary reductions in the cost of manufacture of other products, that have been effected by the application of science and special preparation in those who manage these manufactures, it will demand that every effort which knowledge and skill can suggest, shall be applied to reducing the cost of making gas, and that its selling price shall be correspondingly lessened. Foresight and wisdom should induce our gas companies to forestall this demand, and prompt them to lead, rather than follow, in the road of progress.

As the advocate of progress in gas-making, we gladly welcome every step that promises practical success in this direction ; it is, thererore, with especial pleasure we give our readers, this week, Professor WURTZ's interesting and suggestive report upon the results obtained with the Lowe process at Utica, N. Y.

Every one, of course, understands that the actual cost of manufacturing gas is very far from the cost of the gas sold. To the items of material and labor in making, have to be added the cost of distribution, taxes, repairs, insurance, interest, etc., etc.; so that while a practical economy of, say, 35 per cent. has been found at the Utica works in the cost of this gas delivered in the holders, as compared with coal-gas, yet the saving to the public would be in a much smaller proportion. This reduction in cost has, we understand, decided the managers of the Utica works to reduce the price of gas to consumers. We trust this subject will attract the attention of gas works managers generally, and we shall be pleased to have them discuss it through our columns.

We are obliged, for want of space, to postpone for a week several communications on the policy of the Gas Association, the report of the Meeting of the Association, and other matters of great general interest.

The Effect of the Duty on Copper.

"The brass manufacturers of this country met in New Haven last week to consider the expediency of raising the price of brass. This step is rendered necessary in consequence of the tariff on copper. The duty on pig or ingot copper is 5 cents in gold per pound, which protects the copper mines of the United States, and enables them to get 5 cents per pound more than foreign copper could be sold for here, if there was no duty. The cost of foreign ingot copper laid down in New York would be, for the last year or two, 19 cents ; add the duty, 5 cents ; cost to the Unites States manufacturer, 24 cents. The American copper mine owners keep the price of their copper at an average of of 23½ cents, which keeps out foreign copper; but as the American mines produce a very much larger quantity than is consumed in this country, they are obliged to ship largely to Europe, where they sell it at 19 cents, less freight, which pays a handsome profit."

ABOUT a month ago the above paragraph appeared in the Boston *Daily Advertiser*, a violent Protectionist paper ; and though the statements with regard to the price of foreign copper, during the "last year or two," are not strictly accurate, there can be no doubt but that, for some time past, the price of copper in England has governed its price here, and that this is kept, to our own consumers, at about 4 to 5 cents above the rate at which we sell to foreigners.

During the last year the total production of copper in this country was nearly 40,000,000 lb., of which one-half was produced by the Calumet and Hecla mine. Up to October 10th of the present year, this mine produced 21,000,000 lb., which is somewhat more than half of all the copper mined. It had also, up to that time, divided $9,450,000 in dividends among its stockholders.

Of the total of the copper produced, about one-eighth comes from Lake Superior mines, that never pay any dividends on their stock. About one-eighth, say, 5,000,000 lb., comes from Vermont, Tennessee, New Mexico, and Baltimore, under which last title is included copper collected from a variety of localities.

It is undoubtedly true that a number of unprofitable mines, which together produce, as above stated, perhaps one-eighth to one-tenth of all our copper, would be closed were the duty of 5 cents per pound taken off, and the price of copper correspondingly lowered ; but, even then, our production would exceed our consumption, and no foreign copper would come in ; for our exports of ingot copper alone now exceed 10,000,000 lb. a year, and in cartridges and other forms of manufactured copper, we are sending out probably, at least, 3,000,000 lb. more.

It is also true that, were the competition free, the price would be reduced, notwithstanding the tariff ; but as a combination is able to control about three-quarters of all the copper produced, by far the largest part of the profits derived from the duty goes to add to the quite respectable sum of $9,450,000 of dividends already divided by the Calumet and Hecla. Last year we exported some 2,500,000 lb. of copper in the form of cartridges—a much more profitable form than ingots—and how much more we could have exported in the manufactured form, had our manufacturers been able to buy 5 cents per pound cheaper, it is impossible to say. It is more than probable that with a reduction to the extent of the duty, nearly all the copper exported would be as "manufactured."

As there are few free-traders in this country who advocate absolute free trade, so are there few protectionists who advocate an unlimited reign of protection on any article. It is usual, even for the most ultra advocates of the tariff, to say : "Give us protection for ——— years, and our manufacture will be so strongly established, that it can stand alone without government support." But the desire for protection grows with the subsidy. With a new industry, while the consumptive demand of the country exceeds its productive capacity, the imposition of a protective tariff is, undoubtedly, a powerful stimulant to the establishment of works, manufactures, etc.; but as soon as the productive capacity in any branch of industry exceeds the consumptive demand of the country, a foreign market must, inevitably, be found for the surplus ; and, consequently, the cost of production must be so far reduced as to make foreign competition at home, almost, if not quite, impossible. It would appear, therefore, that in this case, the imposition of a tariff to enable manufacturers to demand from our own people prices greatly in excess of those at which they are willing to sell to foreigners, is a policy which is not to be justified on the ground of legitimate protection of home industry.

The usual crusade in favor of protection, which flows and ebbs with the sessions of Congress, has already commenced, and we note that a number of our protective and protected contemporaries have a weekly sermon on the subject. The free traders, on the other hand, seem also to be mustering their forces, and on all sides the indications of approaching conflict are becoming very apparent.

Among the questions which are likely to attract a large share of the attention of these opposing patriots, is the duty on copper ; and viewed from the impartial stand-point always taken by this Journal, of advocacy of the substantial permanent development of the industries of the country rather than the temporary betterment of one special concern, this question seems to be one that may be acted on with advantage. We would regret the losses to certain mines that would result from the depreciation in the price of copper ; but so far as the legitimate protection of home industry goes, we do not think it was ever intended that the tariff should be applied in such a way as to prevent exporting a material in the manufactured condition, which necessarily follows when foreigners may buy our ingot copper cheaper than our own manufacturers can. This is protection of foreign, not home industry.

Now, since no amount of coddling, or subsidy can increase either the quantity or richness of ore in a vein, and since the production of our rich mines exceeds our consumptive demand, it seems unjust that every consumer of copper should be taxed to make good an unfortunate investment in unprofitable mines.

Canadian Copper Company —At a meeting of the shareholders of the Canadian Copper Pyrites Company, held in Glasgow, it was agreed to accept the provisional offer of Mr. ALEX. MOORE, accountant, Glasgow, as trustee, on behalf of a company intended to be incorporated under the Companies Act of 1862 and 1867, with a capital of £330,000, under the name of the "Canadian Copper and Sulphur Company (Limited)," for the purchase of the whole estate and assets of this company, at the price of £295,000, payable in shares to the intended company. It was also agreed that the company should be wound up voluntarily.

Some Pressing Needs of our Iron and Steel Manufactures.

[ADDRESS of President A. L. HOLLEY at the opening of the Cleveland Meeting of the American Institute of Mining Engineers, October 26, 1875.]

CONCLUDED FROM PAGE 476.

IV.—*Enlarging the Range of Manufacture and Utilizing Waste Products.* The wrought iron manufacture, by reason of its long period of development, and the ease with which old and defective materials and scrap can be reworked, has adapted its products, in a remarkable degree, to every branch of construction, very largely crowding out cast iron from such important works as large columns and long-span bridges. The following remarks will, therefore, apply chiefly to the steel manufacture, which has within it the elements of superseding wrought iron in a still more remarkable degree.

The rapid adaptation of steel to large structural uses other than rails, in foreign countries, should be more seriously considered by our steel makers. For instance, three French men-of-war, built mostly out of Bessemer and Martin steels, were so successfully constructed in 1873, that three more large ships were ordereed in 1874, to be built from the same materials. Notwithstanding the objections so strongly urged against steel ship-plates in England, partly from the conservatism of "practical" men, and more largely from their improper treatment of this material in heating, shaping and applying it, the English Government has recently ordered three vessels to be built wholly of steel, and many private shipbuilders are working in more or less of this better material. Several Bessemer works in England are running exclusively on a general merchant product, having a large range of grades and uses, and taking the place of both crucible steel and wrought iron. The Continental works are turning, probably, a third of their Bessemer product, and nearly all their Martin product i,nto other forms than rails. All the late locomotives—many hundreds—on the London and North-Western Railway are built of Bessemer steel, excepting only the wheels and necessary castings. Everywhere abroad, Bessemer and Martin steels are more and more satisfactorily employed for plates, beams, channels and angles, for ships, bridges, and other structures, and for railway tyres and axles, general shafting, agricultural implements, and the multitudinous forms of machinery bars and fcrgings. In the railway and machine shops, the bridge works and shipyards of Europe, and of France especially, the method of treating steel, of heating and shaping it, and of building it successfully into machinery and engineering structures, has become, what it must everywhere become before this material can be employed to the best advantage, a distinct and highly developed art.

We learn the following facts from Mr. MENELAUS' recent address before the Iron and Steel Institute:—KRUPP, after successfully making thousands of steel cannon, large and small, is now fabricating 14-inch guns of 57 tons weight, to carry 9 cwt. shot 9 miles, and is about to build others of double this weight; Mr. REID, late Naval Constructor, believes that there will henceforth be no obstruction to the large development of steel for shipbuilding, and that the special arrangements required for steel shipbuilding present no real difficulties to a careful builder; steel bridges of large span are successfully constructed in Holland and elsewhere on the Continent, and steel bridge-building in England is hampered chiefly by the Board of Trade regulation, that the material shall not be loaded above five tons in tension, and four tons in compression. The Bolton Bessemer works have produced between nine and ten thousand tons of steel plates, three-fourths of which have been used in boilers. Mr. ADAMSON, the eminent engineer, has built between 600 and 700 boilers out of Bessemer steel, and uses no other marerial for this purpose.

What, on the contrary, is the condition of the manufacture at home? Out of a Bessemer product of some 350,000 tons per year, probably less than 6000 tons are used for other purposes than rails. Very few Bessemer works have any machinery for producing the various constructive shapes required, or any experience in making steel of high or low grades. Bessemer manufacturers are talking about reducing product, in the fear that rail orders will fall below the capacity of their works. Martin steel is now made in American works, regularly and successfully, of all grades, from springs down to boiler-plates, thus furnishing every constructive grade required. Engineers and machinists are generally asking for just such material as steel has proved to be abroad, but are yet hesitating about the use of steel, because our Bessemer manufacturers have not got much into the way of making other grades than rail steel, and Martin manufacturers have not, until quite recently, begun to adopt those improvements in plant and practice which will make steel sell cheaply; and, also, because our artizans have not, in most cases, made any study of the art of working steel, and are, therefore, afraid of it. Experts say that the use of wood, not only in ocean vessels, but in river and lake boats and barges, must soon give way to the use of metal, as it has done abroad, and is beginning to do here; and there are thousaads of wooden bridges on our railways and highways, which must soon be replaced by metal; so that for these two large uses, not to speak of general machine construction, there is growing up a vast market for a better material than iron. Excellent pig, for the production of cheap steel, is obtainable in all parts of the country, and ferro-manganese, upon which important qualities of constructive steels depend, is now cheap enough to wrrrant its general use. In short, with every facility for making the product so largely needed here and so largely used abroad, with the best steel-works in the world, and working organizations in them which have increased product and decreased cost in a remarkable degree, we are devoting more concentrated action to schemes for preventing over-production, than we are to adapting grades and shapes of product to the various constructive uses, and to teaching artizans how to heat, shape and apply them.

The remedies for this state of things are various and obvious, and are indicated in the foregoing statement of the case.

I.—It is, undoubtedly, the policy of every Bessemer works, whether it has the machinery for rolling merchant steel or not, to make, from time to time, experimental charges of high-quality steel, both hard and soft, so as to learn the proper ingredients and treatment. As such steel should be better than the average make, it can be disposed of for rails if it is of the right grade, and if of softer or harder grades, what little would be made experimentally could be sold in one place or another. There might be no immediate profit in it, but it would give the maker knowledge of his resources, facts about cost, experience in treatment, and confidence in his ability; in short, it would put him in a position to take and execute orders. Steel makers cannot expect a very brisk demand for materials which they do not know whether they can make or not, nor what they will cost or be like when they are made. An equally great advantage of this experimental steel making would be an opportunity to test the exact value of their new products in tension, compression and elasticity. I have seen Bessemer-plate made and tested at Terrenoire, out of common Bessemer pig and ferro-manganese, which stretched 19 per cent. and had but 0.16 per cent. of carbon. Some crude Bessemer plate, that I saw made and had analyzed, stood every mechanical test and had 0.21 carbon, 0.029 silicon, and 0.054 phosphorus, which shows what may be done by selecting good materials. If our present pigs are not sufficiently siliconized to blow hot, the addition of manganese in the vessel, in the shape of good spiegel, will answer the same purpose, and help rather than harm the product. The reason why our Bessemer men do not make soft steels and those adapted to a larger range of uses, is because they do not try. But they must try, and succeed, and know what they can guarantee, before they can get orders.

II.—It is also obvious that Bessemer steel makers should increase their facilities for turning out the various *shapes* required, and for putting rail-ends and bloom-ends into marketable forms. Probably, a stand of billeting rolls attached to the rail train, a 14-inch train and direct engine, and a 9-inch train belted from the same engine, would best cover all up to rail sizes. Judging from what the one or two works are doing which have these facilities, one or the other of these small trains should very soon be kept busy on special steels and reworking rail-ends. Probably the best means of re-rolling old steel rails and rail-ends, is the very ingenious device of EDWARDS & ROGERST of Cleveland,—placing the grooves at an angle with the axes of the rolls. The whole rail-end can thus be utilized, while slitting off the flange and stem makes pieces that are too short for economical use. Re-rolling old steel rails and long ends into smaller rails is done successfully abroad. Even small pieces may be utilized better than by remelting, if they are of proper grade and soundness. The Troy works, for instance, are making steel cut-nails, which will drive through an oak plank and clinch.

The large use of steel for structural purposes, however, will be in bars which will require a 21 to 24-inch train, such as angles and small channels, I—beams and deck beams, and large flats, rounds and squares. To change the rolls of a rail-train to fill orders which would necessarily be small at first, for this kind of work, would be very expensive. But a couple of stands of rolls on the end of a rail-train could be changed as often as necessary, without interfering with the regular rail production. The same stands would take the billeting rolls before mentioned. It is probable that boiler plates can be made cheaper and better in the long run by the Martin or by the crucible processes, but ship, bridge and tank plates are successfully made by the Bessemer process. The existing blooming trains can, I believe, be changed from time to time into excellent and fast working plate-trains, by the mere substitution of suitable rolls and fixtures. This feature was considered in the original design of the mill.

III.—It will also be necessary for steel makers to take the initiative in practising, perfecting and disseminating the new art of working steel for structural purposes. The high degree of success which attended the treatment and use of steel in the French ships referred to, was due to an elaborate series of experiments, before and during their construction, on the injury done to plates, bars and beams by hardening, and the remedies—hardening, not by cooling only, but by pressure, as by punching, shearing and cold hammering. It has not, probably, occurred to many boiler-makers who could do nothing with these grades of steel, and so have condemned steel altogether, that shearing and locally hammering plates puts them in a condition similar to that produced by cold-punching, which reduces the strength of the parts above 20 per cent. These injuries, however, are entirely local, although their effects, if not remedied, may become general. It has been demonstrated at the Barrow works (as set forth by the manager, Mr. JOSIAH T. SMITH, in a late paper before the Institute of Civil Engineers), and most completely proved by these French experiments, that the injury done to steels of rail grade and below, by cold-punching, is confined to the skin of the hole (4-100 inch thick in the French tests); and that this injury is only hardening by pressure, which may be completely removed by tempering or annealing, or by reaming out this thin ring of hardened metal. The same is true of shearing; the hardened skin may be removed by planing or restored by annealing. The Bessemer and Martin steels employed were not the softest grades; they had at least 0.25 carbon, and stood 30 tons tensile strain. They were easily hardened, and readily acquired dangerous internal strains; yet they were made so completely tractable by proper treatment, that

they did not fail in manufacture as often as iron did, and gave promise of vastly longer endurance in service. With proper appliances, these necessary additions to ordinary iron-working processes need add but little to the cost of construction. There are still other features of the treatment of steel, especially the effects of heat, which form an important feature of this new art. I will omit its further consideration at this time, from the fact that we are to have a most interesting and valuable paper, at another session, which will present this subject in detail.

The adaptability of steel to constructive purposes was specially shown in stamped work, such as pieces shaped like a low-crowned hat, of which 700 were produced without losing one, while not one good piece could be stamped out of iron. The fact that steel crystallizes less than iron by heating without working, and that steel plates have practically the same strength with and across the "grain," were also demonstrated. The conduct and results of these experiments have been published by M. BARBA, and are republished by VAN NOSTRAND in New York.

IV.—But the advantages of steel, as a constructive material, and of its improved treatment, cannot be monopolized by the present steel makers. There are many iron merchant and rail mills now short of work and likely to loose business every year, as steel is developed, which have nearly all the appliances for working up steel into shapes for implements and structural uses. Such works, abroad, and, to some extent here, are insuring the utilization of all this machinery, and the permanence of their business, by working their way into the steel manufacture, by means of the open-hearth furnace. The Siemens-Martin process has, in such cases, the advantage of working economically on a small scale. Where it is best carried out, the product is cheap enough to warrant its substitution for iron in a large number of uses, and it is particularly economical in that the raw material employed may be largely scrap iron and steel of good quality, and even of bad quality, if rich ferro-manganese is used instead of spiegeleisen. Martin steel rails are in successful service in France and Russia, which contain 0.38 of phosphorus, neutralized by 0.75 to 1.00 of manganese, and replacing carbon, of which element there is but 0·12 per cent.

V.—Finally, one of the most obvious and important methods by which steel makers can promote not only the adaptation of better materials to structural uses, but the increased use of iron and steel structures, is to aid in the government tests of metals which have recently been inaugurated. Many thousands of tons of iron are annually put into bridges and ship-frames, for instance, when bridge and shipbuilders know and admit that steel is stronger and probably better in every way, but they are afraid to use it because they do not know just what the strength, elasticity and ductility of the various grades are. In default of such knowledge they will take no risks. Now this is just the knowledge which this government commission will supply. If steel makers will take hold of the matter heartily, and make it their business to supply specimens of various grades, and to contribute in all ways to the thoroughness of the investigations, they will benefit themselves even more than they will serve the public. This commission intends to avoid the mistake which has made similar experiments, heretofore, of partial and limited value—the mistake of ascertaining only the physical qualities of metals, the chemical constituents of which are practically unknown. They intend to determine what it is, not only in composition but in treatment, that makes iron and steel good or bad, or well or ill adapted to uses in building and in the arts. This information must be of the greatest value to both iron and steel makers. And the final result must inevitably be, not only the adaptation of better materials to current uses, but the vastly increased employment of both iron and steel for new uses.

In conclusion:—While it can hardly be denied that the foregoing criticisms are applicable in more than a majority of cases, it would be not only ungracious, but unfair, to put them forward as representative and characteristic of American practice and management. Our economies, in some departments, have been remarkable, while our general steel-works and rolling-mill practice is, on the whole, superior to that abroad. While the introduction of economical mill-engines is making slow but measurable headway here, the increasing use of reversing engines in England is a step to the rear. The gas furnace and the utilization of waste heat are quite as generally employed at home, as in other countries.

In this connection, I cannot close these remarks without bearing testimony to the gallant manner in which the com mercial promoters of our early Bessemer works poured out money and encouragement to us, who were so long floundering in the slough of technical uncertainties. I refer especially, but by no means exclusively, to the three establishments which first resisted the upper and nether millstones of inadequate professional knowledge and popular prejudice against steel—the works at Troy, Cleveland and Harrisburgh. And it is with a feeling equally of pleasure and of justice, that I also refer to the remarkable production of steel, and to the notable economies in its manufacture, which have been accomplished by the technical knowledge, the workfulness, and the common sense of the superintendents of our various steel works. Let shareholders and directors, remembering the outcome of the troublous past, bear in mind what results the future should bring forth, when technical management of this quality is reinforced by that system of improvements, which this paper has but too inadequately set forth.

The Mauch Chunk, Pa., Gas Company has reduced the price of gas from $4 50 to $4 per 1,000 feet.

Korting's Jet Apparatus and Gas Exhauster

From the Franklin Institute Journal.

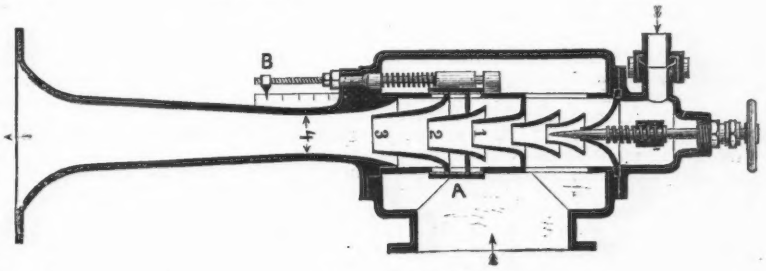
THE invention of M. GIFFARDS's injector, and the success attending its introduction, suggested at once the application of its principles to other purposes. Out of it, besides a host of "injectors," have grown the "ejectors" and "ejector condensers" of various makers. Prominent among the workers in this field appears the name of Mr. KORTING, of Hanover, who has of late directed his attention to the utilization of induced currents as a means of transmitting motion and power; some of this gentleman's very successful applications of the steam jet are exceedingly interesting, and well worth the careful attention of engineers.

Our attention has recently been directed to this subject by Messrs. SCHUTTE and GOEBRING, of this city, who, we understand, are the licences of Mr. KORTING in this country, and who have made some modifications in his inventions, adapting them to American use. In Mr. KORTING's "Forge blowers," a jet of steam of about 1-32 of an inch in diameter, puts in motion a column of air of, let us say, 10 lb. pressure. This induced current of air, mixed with the steam which set it in motion, and by which it was warmed, passed into and through the inducing nozzle of a second apparatus, where it increases its volume by additional air. The volume of air discharged from the first blower, and used as an inducing current in the second blower, is conveyed to it through a receptacle constructed as a cooler, in such a way that the air which is drawn in by the second blower, is also made to pass through this receptacle, side by side with the mixture of air and steam, thus taking up some heat, condensing the steam contained in the primary blast, and in this way forming a condenser and a heat regenerator at the same time, so that the heat of the small amount of steam employed at first, is used in warming the blast, while the blast is freed from moisture, which might be detrimental in obtaining welding heats.

We now present a cut of Mr. KORTING'S "Gas exhauster," for the purpose of keeping the pressure off the retorts, or a slight pressure or vacuum on the retort, as may be required. This instrument illustrates the principle applied to all of the KORTING devices for forcing or exhausting air or gas.

The inducing current in this case is a steam-jet, the quantity of which is controlled by a spindle in the steam nozzle; and the induced current is formed in a series of nozzles of increasing area. The purpose of these nozzles is to regulate the admission and proper mixture of the inducing and induced currents in such proportions as not to lose power by sudden shocks. In the particular use to which this instrument is applied, as in many other cases, the quantity of delivery must be variable, while all the other conditions remain the same. Thus, supposing the difference of gas consumption in winter and summer to be, say four to one, in each case the counter-pressure of the washers, purifiers, etc., remains the same. To overcome a certain pressure, the induced current must have a certain speed, depending on the specific gravity of the liquid or fluid, so that to reduce the quantity of delivery working against the same pressure, the size of the instrument must be reduced, *i. e.*, the area of the last mixing nozzle must be reduced. This is accomplished in the following manner:

Delivery. Steamed.



Air or gas admission.

The inlet to the last three mixing nozzles are closed by a slide, A, so that in the position of the slide, as shown in the cut, the last admission of gas is through nozzle 1, which, in this case, constitute the size of the instrument, and the gas admitted up to 1 is from there discharged through the remaining nozzles, the same as if they were a combination of the diverging tube. By forcing the slide towards the delivery end of the instrument so as to admit gas successively through 2, 3 and 4 by uncovering the inlets into these nozzles, the capacity can be increased correspondingly to the area of their nozzles, all other conditions remaining the same, except a proportionate increase or decrease of steam admission by means of the spindle in the inducing steam nozzle. From experiments we have seen tried, great care is needed to have these various parts correctly proportioned, but when so proportioned, the instrument is said to be economical, and to compare favorably with other efficient devices. It is claimed by the makers that the correct proportion is so imperative, that instruments made of the same general size, but not correctly proportioned, have been found to require ten times the amount of steam, for the accomplishment of the same purpose that a well-constructed apparatus needs.

Mr. KORTING claims, that for all purposes where a blast of air or other gas is needed, his instruments will be found economical and convenient; and that in producing and maintaining a vacuum, of, say, twenty-two inches of mercury, they have proved successful.

All jet apparatus work may be classed under the head of the mode of performing work by the continuous action of combined bulk and velocity. The principle has been quite fully illustrated in the various papers that have been written on the Giffard injector for supplying steam boilers with water, so far as that instrument is concerned, and well-informed engineers are apt to speak of all kinds of jet apparatus as Giffard injectors. But a Giffard injector cannot be used to perform all the kinds of work to which the jet has been successfully applied in well-proportioned instruments. Thus, while the Giffard injector is admirably adapted to forcing water into a steam boiler, it presents a very uneconomical mode of merely lifting water into a tank.

In each application of the jet of steam to perform work, the apparatus must, of necessity, be modified to suit the peculiar work required to be accomplished. The two examples of the gas exhauster and the forge-blower, explain what we mean, in both Mr. KORTING's arrangements of multiple nozzles, *i. e.* of nozzles which take in the air or gas in succeeding spaces and succeeding nozzles, are used; but in one process there is no attempt to separate the steam from the gas, while in the other the steam is condensed, in inducing a second ingress of air, which enters the fire free from moisture. When the blowers actuated by jets of steam, are used as undergrate blowers, the steam admitted with the air is a positive

advantage, as the grate bars are somewhat preserved, and the slight moisture seems to act advantageously, on the fire, which is required to yield its heat from the surface of the fire after the air has passed through it, and combined with the burning fuel. In a forge-fire, or in a cupola, the heat is required to be used at the point where the air strikes the fuel, and in the mass of the fuel—not from the surface of the fire.

Investigations on Iron and Steel Rails made in Europe in the Year 1873.*

BY T. EGLESTON.

CONTINUED FROM PAGE 478.

ALL the roads require the manufacturers to allow the agents or engineers of the companies to have free entry to the works, during the time of manufacture and to watch it day and night, if they wish to ascertain whether the conditions of the contract are being carried out with respect to quality, resistance, and proper manufacture; but it is understood that all observations or remarks which the agents of the company have to make, should be addressed to the director of the works and not to the workmen.

The manufacturer is made responsible for all delays which may result from the rails delivered not being in accordance with the contract. The Orleans RR. stipulates that, if there is any delay in the delivery of the rails, an indemnity of one per cent. per month on the price of the rails may be charged to the manufacturer. If after having been notified that this delay is injuring the company, the manufacturer still delays to furnish the rails for a month longer, the company is at liberty to rescind the contract.

The manufacturer takes all the risk and expense of loading, transporting, and discharging the rails up to a point agreed upon by the company for delivery, and he agrees to pile them there in regular piles.

The Northern RR. requires that the rails must stand a wear of at least two years without any alteration whatever. The Lyons RR. requires that they shall stand the passage of at least 15,000 trains. The Orleans railway makes the life of the rail 2, 3 and 5 years, depending upon the traffic over the section of road on which it is placed, and stipulates that this guarantee does not apply, in any way, to provisional lines, nor to switches in the quarries, etc., but only to the main line of the road. The manufacturer agrees to make a stipulated reduction in the price of the rails according to the number which have not resisted during the prescribed time.

The Northern railway requires that 10 per cent., at least, of the rails furnished are to be placed on the road in positions selected by the company, of which the manufacturer is to be notified. At the end of two years, the number of rails which have undergone any kind of deterioration, such as crushing, unwelding, exfoliation, or breaking, are counted, and allowance must be made for them by the manufacturer. It reserves the right to commence the testing of rails on the road bed whenever it pleases, but agrees that the indemnity must be settled within two years, at the latest, after the receipt of the rails, whether the trial on the road is finished or not. The responsibility of the manufacturer does not cease until the rails have been definitely accepted by the company.

All the roads provide that the reception of the rails by the company does not diminish the responsibility of the manufacturer to replace rails which break, either in transportation or within the times specified by the contract after they are laid. The Orleans Co. requires that broken rails shall be replaced within a month after the manufacturer is notified that they are broken.

All the companies stipulate that no part of the contract can be sublet without the written sanction of the company.

The Lyons and Orleans RR. agree that 85 per cent. of the value of the rails which have been received at the works shall be paid in the course of a month, after their reception, 10 per cent. within a month which follows the delivery of the rails at the place agreed upon by the company; the last 5 per cent. is paid by the Lyons company on the final reception, and by the Orleans company the year after the guarantee of the rails has been fulfilled. A certain sum is fixed by the Orleans RR., however, which the last five per cent. shall not exceed, and when this amount retained, exceeds the amount stipulated, the second payment is raised to 15 instead of 10 per cent

CONTRACT FOR STEEL RAILS.

The contract for delivery of steel rails generally requires, that the rail shall be of the American pattern, a steel or iron profile of which is furnished to the manufacturers. It requires that this profile shall be followed exactly, throughout the entire length of the rail, so that there will be no alteration of the section, when the rails are cut to length. All rails which do not fulfill this condition are rejected. A toleration of one per cent., however, at the greatest, is allowed. On the Lyons RR. the rail weighs 35k. They provide the foot of the rail shall be 100 m.m. wide, its height 128 m.m., and the stem of the rail 14 m.m. thick. If the manufacturer makes a rail 130 m.m. wide, whose foot has been damaged in the rolls, they will allow him to plane it down to 100 m.m., providing that all the defects are in this way removed. The Northern and Orleans RR. do not prescribe the dimensions, but furnish the pattern which the mantfacturer is required to follow. The normal length of the rail at the Northern RR. is 8 m., but 1-10 of the amount of the contract may be delivered in rails cut to the length of 7.96 m. Besides this, another fraction, which varies from 1-15 to 1-20, may be delivered 7m., 6m. 5m. long respectively, the quantities of each length being fixed by the company. At the Lyons RR. the length of the rail is fixed at 6 m. for 9-10 of the whole order; the other 1-10 may be composed in part of rails 5.96m. in length. In order to facilitate the manufacture, 1-30 part may be accepted in rails of a shorter length than 5.96m., but it is understood that these rails shall be made entirely of rails intended to be 5.96m., or 6m. in length, which were cut off on account of defects in their ends. The number of these short rails is determined by the contract. All the companies stipulate that the short rails shall be made from rails intended to have been longer but whose ends have been cut on account of defects. All the companies reserve the right to order longer rails, for a certain price fixed upon before hand.

The rails are generally cut to length, hot, as they come from the rolls, by means of saws which cut both ends at a time. The definite length is afterwards given, in a lathe, or milling machine, or by any other means which is not likely to injure the end of the rail, and which is acceptable to the company. The Lyons RR. reserves the right of at any time modifying the shape of the rail, without the manufacturer being able to claim any indemnity, but the company binds itself to accept all the rails made previous to the modification, and conformable to the present contract. The normal weight of a metre of the rail, is always established on the first delivery of 100 rails, whose sections are conformable to the model. In the reception at the works, a toleration of 2 per cent. more or less is allowed, provided that on the whole order the variation does not exceed 1 per cent. Over one per cent the increase of weight is not paid for. A rail which is too heavy, may be entirely rejected if the company see fit.

The cast iron and other material, out of which the steel rail is to be made, must be made from ores, sufficiently pure to be certain that the rail produced will be tenacious and hard. The cast steel manufactured may be made either in crucibles, or in furnaces, or by the Bessemer process. Sometimes the contract specifies, that they shall be of Bessemer steel. The operation must be conducted in such a way as to give first class steel, fine grained homogeneous, hard, tenacious, and capable of being tempered throughout, when drawn out into bars of from 15 to 22 m.m. square. In all cases the manufacturer is required to furnish samples to which the rails must conform. The manufacture of the rails is not allowed to commence, until a type specimen of the steel has been submitted to the engineer of the company.

The ingots for the manufacture of the rail are required to be of, at least, a single piece for each rail. The Northern RR., for the rail of 30 k., requires the section of the ingot to be at least 22 by 20 cm. if they are square, or, if circular, a diameter of 23 cm, The Lyons RR. requires for the rails of 35 k., the rectangular ingots to have their angles rounded, to be at least 25 cm. square, or, if they have a circular section, a diameter of at least 28 cm., and stipulates, that the weight of the ingot must exceed that of the rail to be manufactured by at least 35 k. The Orleans Company does not prescribe the size of the ingots. The section of these ingots may not be modified without the approbation of the engineer. After casting the ingots, the liquid metal must be covered over with a piece of sheet iron, and argillaceous sand must be thrown upon it and pressed down, so as to fill up the interior of the mould. The ingots must be examined with care, and those which show blow holes, or impurities, or other defects which the rolling will not cause to disappear, are rejected. Simple cavities, as well as thin edges of metal on the sides, whether caused by defects in the ingot moulds or not, must be cut off with the greatest care before the ingots go to the rolls, and over a sufficient space to make it impossible for the sides of the blow hole or of the edges to turn over. Any ingot showing cracks, or breaks, or otherwise defective, are to be rejected, The ingots must be heated only sufficently for them to undergo the operation of rolling, and the rolling must be so conducted as to get the exact form of the rolls, and every effort must be made to prevent the rail from being bent, as it comes out of the rolls.

The Orleans RR. requires, that in case the manufacturer carries on his works in two places, and that the ingots are made at a different place from that in which the rails are made, the ingots must be classified separately, and their place of manufacture indicated by marks, so that the agents of the company may be able, if necessary, to ascertain the history of their manufacture. One ingot out of every 20 castings is broken. If this ingot shows, in the part adjacent to the outside, blow holes in any number which are more than 30 m.m. in depth, the entire casting from which it came may be rejected. The fracture of these rails must be fine grained, nearly compact, entirely homogeneous, without brilliant white points resembling the fracture of cast iron. The hardness is regulated by the type specimen which is furnished by the company. Repairing the rails, either cold or hot, is positively forbidden. The surfaces of the rails are required to be smooth and uniform. All the rails which show cracks, breaks, lamellated surfaces, etc,, coming from blow holes, cracks, or flaws of any kind, are rejected. Only such superficial cracks or imperfections are tolerated, as cannot in any way injure the strength of the rails.

All the roads require that the rails shall be straight through their entire length, and that they must, as far as it is possible, be straightened on all the four faces hot, as they come out from the rolls. This must be done on cast-iron plates, or any other suitable bed arranged for the purpose, and the rails must then be placed on a solid structure to cool.

The final straightening, made when the rail is cold, must be made by a gradual pressure, without shock, and in performing the operation the foot of the rail must be arranged in such a way that there will be no danger of cracks being produced in it. The ends cut off from the rails must be examined for texture, and if the quality is not sufficiently good, the rails are to be rejected. The length to be cut off from the ends of the rails, is 70 c m. for the extremity corresponding to the upper part of the ingot, and 30 c.m. for that corresponding to the lower part. The hot rails, as they come from the rolls, are to have both ends cut with a saw. The final length is given cold in a lathe, planing or morticing machine. Heating the ends of the rails, in order to cut them, is positively forbidden. Whenever the rails are cut with a saw, as they come out from the rolls, their ends must be carefully dressed. Whatever the method of dressing the ends may be, it must be conducted in such a way as to make no alteration in the form of the end of the rail, and the method shall always be approved by the company. The end surfaces of the ends of the rails must always be parallel and at right angles to the axis of the rail. All superfluous metal must be cut off with a graver or file, the use of the hammer for this purpose being positively forbidden. All the rails must have two square cuts at each end, and must also have at each end two holes for the fish bolts, which must be bored with a drill in the stem of the rail, in accordance with plans and drawings which are given, and which prescribe not only the size and place of the holes, but also the methods of boring them. These holes must never, for any reason, be punched. The edges of these holes must be perfectly clean, and all superfluous metal must be removed with a file. The Orleans and Lyons RR. allows a toleration of only ½ millimetre in the distance and size of these holes. All the rails must have the name of the works, the year and month of the manufacture, and the kind of steel, whether cast, Bessemer, or Martin, marked on them in relief.

All these marks must be engraved in the rolls, except that denoting the nature of the steel, which may be made with a point after the rails are finished. All the rails are classified as soon as possible after they are made, so that they can be inspected and tested at the works, those made during one, two, three or four days, or those from the same casting, being piled together. The engineer designated to receive the rails, takes from these piles a number of rails, and the corresponding rail ends, to be tested. The number is variable; it is not more than one per cent. on the Northern Railroad, and not more than one-half per cent. on the Lyons Railroad, while the Orleans Railroad reserves the right to test five per cent of the rails, and their crop ends; but the companies reserve the right of making tests on any other rails not comprised in these piles, provided the piece experimented upon is 0.70 m. in length, and without flaws. The tests are essentially the same in all the companies, but differ somewhat in in detail, the differences corresponding, for the most part, to the weight of the rail. All the companies use the same type of testing machine, and a weight of 300k., which is allowed to fall on the rail from different heights. At the Lyons Railroad, where the rail weighs 35 k., each one of the rails selected from he piles to be examined is placed upon its foot between supports 5 m. apart,

* A paper read at the St. Louis meeting of the American Institute of Mining Engineers, May, 1874.

should be able to support, for five minutes, a charge of 2,500 kilog., without receiving a permanent set of more than 1 m.m. The same rail, placed between supports 1 m. apart, must support for five minutes, in the middle between the supports, a pressure of 20,000 kilog. without receiving a permanent set of more than ¼ m.m. The same bar, in the same position, must support, during five minutes, a charge of 35,000 k., which will then be increased until the rail breaks. At the Northern Railroad the tests of pressure are somewhat different. The rails are placed on supports 1.10 m. apart, and must support, in their middle, for five minutes, without receiving any permanent set, a pressure of—

20,000 for a rail weighing ..... 37 kg.
18,500 " " " ..... 35 "
17,000 " " " ..... 30 "

without having a perment set of more than 25 m. m., a pressure of—

35,000 for a rail weighing ..... 37 kg.
33,000 " " " ..... 35 "
30,000 " " " ..... 30 ";

The Orleans Railroad requires that the rail, placed on supports 1.10 m. apart, should support a weight of 16,000 k. for five minutes, without preserving any set, and without breaking, a weight of 35,000 k., also for five minutes. The pressure is then increased until the rail is broken.

At the Northern Railroad each one of the halves of the rail so broken, is then placed between supports 1.10 m. apart, which are fixed upon a block weighing, at least, 10,000 k., supported upon a foundation of masonry, which must be 1 m. in thickness, and 3.3m. square at the base, and must bear, without breaking, a weight of 300 k. falling upon the middle of the bar, which, for a rail weighing

37 kg., must fall from a height of 2.50 m.
35 " " " " " 2.40 "
30 " " " " " 2.25 "

The Lyons Railroad, for the rail weighing 35 kg., requires a height of 1.70 m.

The following table shows the permanent set which will be admitted for rails of various weights by the Northern Railroad:

Height of fall in meters	1	1.50	2	2.25	2.40	2.50
Permanent set in millimeters for rails weighing 37 k.g	1	3	6	0	0	10
" " " " " 35 "	1	3·33	7	0	11	0
" " " " " 30 "	1	3·50	8	18-20	0	0

The Lyons Railroad requires: the height of fall, 1·70 m.; permanent set for rails weighing 35 kg., not over 12 m. m.

The Orleans Railroad requires the rail to resist a height of 2.10 m.

The elasticity of the bar will be shown by the way in which the weight rebounds when it strikes.

If one of the bars tested breaks below

2.50 m., for a rail weighing 37 kg.
2.40 " " " " 35 "
2.25 " " " " 30 " ,

or should preserve, at this height, a permanent set of more than 2 mm. beyond that indicated, the Northern RR. requires the test to be continued on a greater number of rails, and if more than 1-10 of the rails tested do not resist, the entire pile from which they were taken is rejected. The Orleans RR. provides that all the five crop ends of the rails selected may be broken by the drop hammer, in order to examine their texture, and that the rail corresponding to the rail end which has the worst fracture, shall be selected as the one to undergo the test of shock. If this rail resists, the rest of the series will be accepted, but if, on the contrary, it breaks, a second rail will be tried and so on. If each one of the five rails breaks then the whole hundred will be thrown out. At the Lyons RR. if one rail does not stand the test, all the rails from the same casting may be rejected, unless the manufacturer desires to continue the testing upon two other bars which, if they resist, will cause others to be accepted. At each casting, one ingot heavier than the others is required to be made, in order to get a sound rail of 70 cm. greater length than the others. The part 70 cm. is at once cut off from the rail, and must correspond to the upper end of the ingot. The number of the casting and the other marks made upon the ingot from which this end for testing was made, are reproduced upon the piece of rail. This piece of the rail is placed on two supports 50 cm. apart, and must support the shock of a weight of 300k. falling on the middle from a height of 1.30 m. The two supports are made of cast iron, with rounded angles, and rest upon the same kind of a foundation as that upon which the rails are tested. When this end of the rail does not support the test, a rail of the corresponding casting is submitted to the test of shock and flexture, and if it does not resist, the whole casting may be rejected. A piece of the head of the rail, at least 20 cm. in length, is then broken, and heated to cherry red and plunged into cold water, in order to get a hard temper. The surface of the rail should then be whitened, perfectly clean, and with difficulty touched with a file. If the steel is of good quality it should, during its immersion, produce considerable noise, with slight explosion, and crack in several places. It must be broken afterwards in the middle, in order to judge of the degree of temper and the transformation of its texture. A piece of the same rail, 3 cm. wide and 2 cm. thick, is then drawn out and submitted to the same test. The result should be the same, but the grain of the fracture should be much finer than that of the specimen of the rail tempered without being drawn down. The test of tempering is made upon one casting out of ten consecutive ones. From a piece of the same rail a graver, a turning tool, a morticing tool, and a planing tool should be made. These tools, tempered in the ordinary way, should, without breaking or bending, cut the outside bed of a white iron casting. The Orleans RR. requires that the rail should be forged from 20 to 30 mm. square, and be tempered so hard that they will break easily. The fracture of the broken rail should have a fine uniform grain, and a much finer texture than before tempering. A piece of rail is then rolled out to 75 mm. in length, and 1 cm. thick and made in the shape of a spring. The spring is laid upon supports and tested with a weight placed upon its convex side, in the middle. The spring should be capable of being lengthened 4 mm. per meter, without breaking. All the rails submitted to the test by shock should undergo this trial. A provisional acceptation of the rail is made by the agents of the company at the works, and, so far as possible, as they are manufactured. The object of this is to sort, weigh and mark all the rails which fulfill the stipulated conditions. All rails which, either in transportation, before or after being laid upon the road bed, are broken within a certain specified time, must be replaced. The entire expense of the apparatus for making the tests, as well as the labor of receiving and testing the rails, is borne by the manufacturer. All the rails accepted are marked at their ends, and those which are rejected are also marked in a way that will effectually prevent their ever being used on the road bed. All of these marks must be easily seen, and must be made in such a way that they cannot be effaced. The Northern RR. requires a guarantee of the rails for six years from the date of their manufacture, whether they are employed on the direct line or upon switches. The Orleans RR. especially provides that the guarantee shall not extend to rails laid in ballast quarries, or put down for the purpose of building any part of a new road.

Every rail that during this time is broken, or becomes deteriorated in any other way than by ordinary wear, must be replaced by the manufacturer. This exchange of damaged rails for new ones takes place at places indicated in the contract. At the Lyons RR., all rails which are broken or injured before 15,000 trains have passed over them must be replaced. Whatever may be the cause of the fracture, all the rails broken within a period of 3 years and 3 months after they are delivered must be replaced, or, if the manufacturer does not care to replace them, he may indemnify the company in money. In order to ascertain what this is likely to be, five per cent. of the rails delivered may be placed by the company on its line, on curves, or wherever else it shall be judged most convenient, and the manufacturer is notified of these places. At the expiration of the delay necessary for the passage of 15,000 trains, all the rails which show a commencement of deterioration, like crushing, want of proper welding, exfoliation, fracture, etc., comprising those which have been already replaced, shall be noted.

The proportion which is fixed in this way, is applied to the entire order. The indemnity for every ton of rails, without taking into consideration rails which may still be used by being made shorter, is fixed by contract and is intended to represent the difference in value between a ton of the new rails and a ton of the rejected rails, both delivered in the depot nearest to the manufacturer; but the rejected rails, except the broken ones which are replaced, will remain the property of the company. The rails must be delivered on the cars at the railroad station nearest to the works of the manufacturer, or deposited in regular piles which can be easily counted at some other place, if so indicated by the contract. Transportation from the works to the place of delivery is in all cases to be made at the risk and expense of the manufacturer.

The payments are made at Paris. The Lyons RR. pay 95 per cent. of the value of the rails at the end of a month after their delivery, the other 5 per cent. after their final reception. Both the manufacturers and the railway companies are exceedingly particular in their instructions with regard to the treatment of rails in transporting them on the cars, and particularly in discharging them from the cars; throwing the rails or allowing them to fall from any height being most positively forbidden.

TO BE CONTINUED.

The Coalfields and Coal Production of Colorado.

WRITTEN FOR THE ENGINEERING AND MINING JOURNAL, BY EDWARD L. BURTHOND, C.E.

IT is now more than thirty years since the coal beds of the Raton Mountain, in Southwestern Colorado, were described by Captain EMORY. In 1858-59, the coal beds of Boulder County were discovered by some adventurous gold seekers on Coal Creek; it was 1860 before the large and extensive coal deposits on Ralston's Creek, now known as the Murphy mine, were first found and prospected.

Since that period, year after year, the mines at Golden, at Marshalls, on South Boulder, at Baker's mine and Erie were successively explored and opened, while within 10 years the mines of coal on Hardscrabble Creek, near Cañon City, near Cheyenne, on the Purgatory River, on San Juan River, in Middle Park, and on White and Bear Rivers, West of the mountains, have been successively discovered. In 1873-74, in Southwestern Colorado, on the Gunnison River and its branches, very valuable mines of anthracite and of semi-bituminous coal have been found by the several adventurous parties of gold and silver prospectors who have examined every nook and valley of that region.

The precise area of coal-producing land in Colorado has not yet been accurately defined; it can be approximately put down as several thousand square miles, of which not less than 1265 square miles are known to produce excellent coal in abundance, and at depths nowhere exceeding, for horizontal veins, 200 feet; but as there are large areas but imperfectly known, where we may look for a continuity of croppings extending in a horizontal direction, at depths not less than 800 to 1000 feet, it will be many years before the demand for coal, as a fuel, or for industrial purposes, will require such deep exploitation.

The age of the coal of Colorado, and its proper geological "horizon," has been a fruitful theme of discussion, and a field fertile in contradiction. The coal has been called "Brown coal," "Lignite," "Semi-bituminous"; its claim to be called coal has even been disputed by some who, under the false impression produced by the name imposed upon it of "Lignite," have jumped at the conclusion that it must be a very poor substitute for coal; and, as a fuel, not better than the miserable qualities of lignite mined in France and Germany, and as such, of inferior quality for fuel or for industrial purposes.

This impression, however, has nearly passed away, and we think to-day the better qualities of Colorado coal are fully known; and it is found equal, if not superior, for heating purposes, to the best kinds of Iowa, Illinois and Ohio coals, while its freedom from sulphur renders it peculiarly well adapted for certain metallurgical and smelting purposes, for the burning of pottery and brick, and for use in locomotives.

Dr. J. V. HAYDEN and his skilled assistants, who comprise a special corps of scientific men, upon whom devolve the kindred branches of animal and vegetable paleontology, descriptive and stratigraphical geology, and mining geology, have, we conceive, placed this subject on a footing of undoubted certainty, for all the coal found along the eastern side of the Rocky Mountains, from Santa Fé to the British Possessions. After years of patient and of toilsome investigation, Prof. HAYDEN pronounces our coal in Eastern Colorado as "Tertiary"; although its close proximity to the point of separation between the Cretaceous and Tertiary beds, and, in some localities, a blending of some two or three species of mollusca that are "Cretaceous," in and above beds otherwise indubitably "Lignite Tertiary," has complicated the question, and found strenuous advocates; but, inasmuch as the disputed points are referred only to "Lignite beds" belonging in Wyoming and Utah Territories, whose affiliation and vigorous identification with those of Eastern Colorado is not so easily proved, we believe, and have believed for several years, that the coal of Colorado, East of the Rocky Mountains, is undoubtedly "Eocene Tertiary," although small beds not over 8 feet to 12 feet thick are found in the Miocene also.

Profs. HAYDEN and LESQUEREUX have vegetable paleontology entirely in their favor; and as we see the underlying "Cretaceous" is a strictly marine formation; that it is in discordance with the lignite beds, and that the Flora of the Dakota Group in Kansas and Nebraska is totally and specifically different from the "lignite Tertiary," and immediately following the Permian; while neither formation yield coal of any value, and do not appear in the underlying succession of strata following the Triassic and Jurasic along our foot hills; hereafter it may be proved that in Wyoming Terr., Cretaceous (upper) coal beds exist followed by marine or estuary deposits with true Cretaceous mollusca; and

succeeded by lignite beds of the "Eocene" distinctly fresh water and terrestrial, could it be expected then that if the "Cretaceous Flora." the presumed parents or ancestors of "Tertiary Flora" could have survived; and that the conditions of climate and temperature have but little modified between the two periods; is it, we ask, unreasonable to believe the Dinosaurs of the Cretaceous were perpetuated until in the "Eocene Tertiary?" We believe this to be the case at Golden City, if not elsewhere.

The investigation of Prof. HAYDEN in 1874 and 1875 we think will positively settle all these disputed points, and will place the question, we believe, beyond doubt.

The general topography of Colorado, between the 37° and 41° north latitude can be given in the following general terms. Previous to the uplifting of the Rocky Mountain system, with its side ranges and prolongations, the whole country from the 98° west longitude to the Wausatch Mountains, was a nearly continuous horizontal deposit of Cretaceous and Tertiary deposits, lying in Kansas, we know, upon Permian formations, without intercalation of any intermediate formation of Jurassic and Triassic. The development of Cretaceous and Tertiary strata has been enormous in Middle Park, amounting to probably more than 30,000 feet, while the dislocations, twirling, folding and upheaving of the metamorphic and eruptive rocks of the Rocky Mountains have broken the continuity of this area, in a north and south direction, and have left in North Middle and South Parks isolated patches of these formations, surrounded by eruptive and metamorphic chains of high mountains, and have tilted up and exposed on edge the coal beds of the "Eocene," formed when this region was an enormous area of fresh-water lakes and swamps, and forests of dicotylectonous trees and shrubs, with ferns and palmettos of various forms; all these having followed the recession of the "Cretaceous" seas.

We believe, however, that between these two well marked "periods" or eras, extensive areas were occupied by shallow salty marshes and lagoons, in which even marine crustacea and mollusks were unable to live; thus forming favorable conditions for the deposit of the red beds, and gypsum and clay formations, similar to the same beds found in the old red sandstone, and until the Triassic age. These red beds, of nearly 1,000 feet in thickness, are well illustrated in the Cañon of the Purgatory, and are overlaid by upper Cretacious beds of gypsum, limestone and sandstone, and these again by Inoceramus beds with fossil fucoids, and these, in turn, by the coal beds of the Raton Mountains, and the Tertairy hills of the coal overlaid or capped by dolerite of probably Miocene age.

So far, no coal beds of the true carboniferous formation have been found in Colorado, although carboniferous and Permian beds have been found and identified in South-west Colorado and on the Arkansas River. The White River mines of coal are in Tertiary strata but are yet little known.

As we might expect, the quality of Colorado coal presents marked contrasts, and its quality as a fuel is in general closely indicated by its proximity to the uplifting power of the forces that were exerted in raising up the Rocky Mountains. In general, the coal fauna East of Platte River, on the great Plains, or at distances varying from 12 to 25 miles from the mountains, has been but little acted upon by the heat and pressure, and its horizontality but little disturbed; but whenever we reach the close neighborhood of the main mountain chain, or the influence of the erupted dikes of Dolerite from the Spanish Peaks eastward, or those from Bear Creek to Boulder Creek, we find the coal more dense, brighter, and purer; with an increased percentage of carbon, and a decreased amount of water, either chemically or mechanically combined. The following table, taken in part from Dr. F. V. HAYDEN's *Report*, of 1873, shows this plainly:

Locality.	Water.	Volatile Matter.	Carbon	Authority.	Remarks.
1 Erie mines.....	14.80	34.50	47.30	HAYDEN & HODGE.	
2 Marshall mines....	12.00	33.08	49.72	" "	2 miles E. of mts.
3 Baker mines	15.00	30.50	50.65	" "	
4 Murphy mines....	11.70	29.07	55.31	J. G. BRUSH.	West to dike ½ m
5 Golden mines. ..	13.67	30.75	51.48	5 analyses by different parties.	
6 Cañon City Mines,	5.40	36.40	54.70	HAYDEN & MEES.	
7 Trinidad mines..	8.84	18.09	64.04	Tenn. school of mines.	Near dike.
8 Gunnison river....	1.50	—	91.00	" " "	Anthracite coal.

1. Erie mines are 15 miles east of the Mountain range. 2. Marshall mine 2 miles east 3 Baker mine 13 miles east of mountains 4. Murphy mine 1 mile east of mountains 5. Golden mine ½ mile east of mountains. 6. Cañon mines in the mountains in the cañon of the Arkanses River. 7. Trinidad mines are in Fisher Peak and down the Purgatory River several miles. 8. Gunnison River coal is in the uplifted red strata of the mountains.

INDUSTRIAL USES.

Trinidad coal is excellent fuel, it contains little or no sulphur, and is good coking coal. Cañon City coal contains a little sulphur, and is filled with veins of selenite and calc spar; it makes but poor coke. Golden, Murphy and Marshall coals make no coke, are clear, clean and bright in fracture; specific gravity about 1.32 mean, are used for fuel for heating, for locomotives are not surpassed; and for brick and pottery manufactures, for roasting ores, for blast purposes, for lead or copper smelting they are excellent, are free from sulphur and slag, and yield a light ash and form no sooty deposit like Trinidad, Cañon City, Iowa, Illinois, Ohio and Pennsylvania coals. WM. WEST, Esq., uses Colorado coal powdered and driven by blast with very good effect; by this he obtains great heat and better combustion.

LIST OF COAL MINES AND THEIR PRODUCE SINCE DISCOVERY TO SEPTEMBER 30, 1875.

			Tons.	
Marshall mine, Boulder County,	C. T., discovered	1862–3	32,000	
Murphy mine, Jefferson County,	" "	1860–1	125,000	
Mitchell mine " "	" "	1869	1,000	
Swain Coal Company, Weld Co.,	" "	1870	5,000	
Vessels Coal Bank, Jefferson Co.,	" "	1865	100	
Rowe & Wheeler mine " "	" "	"	500	
Ralston Coal Company " "	" "	1860	2,000	
J. W. Johnson mines " "	" "	1865	900	
Golden colliery " "	" "	1862	87,504	
Welch & Knapp mine " "	" "	1866	150	
Lyden coal mine " "	" "	1862–3	1,500	
Erie mines Weld County	" "	1862–4	156 000	Approx'n.
Baker & Eulner " "	" "	unknown	15,000	
Davidson, Boulder County,	" "	1863–4	6,000	
Arkansas coal mines, Tremont County,	"	1862–3	72,000	Approx'n.
Trinidad		1845–6	unknown but very little mined yet.	
		Total,	512,154 Tons.	

Report upon the Lowe Process of Making Illuminating Gas from Carbon, Steam and Petroleum.

By Professor HENRY WURTZ.

To H. H. FISH, ESQ.,

Manager of the Utica Gas Light Company:

SIR—In compliance with your wishes I have, during two visits to Utica, made a chemical investigation of the methods of making water-gas, and enriching the same with petroleum, as now in use at the works of your company in that city, and I have the honor to submit to you my results and conclusions regarding the same.

I.—PRELIMINARY REMARKS.

The Lowe process belongs to that general class of water-gas methods, which has always been held by chemists who have given their attention to the subject, (including the undersigned), to involve the greatest number of elements of ultimate practical success—namely, that class in which mixed hydrogen and carbonic oxide gases, produced by the action of steam upon carbon at an intense temperature, are afterward combined with richly carburetted gases, to communicate illuminating power. Petroleum is, in this case, the source of the richly carburetted gases.

In a report of the undersigned, made to the Manhattan Gas-Light Company of New York City, in 1864, eleven years since, the ground was taken that practical success in this class of methods, *economy* being taken for granted, was at that time dependent, mainly, upon the attainment of two points, viz., the reduction of the *carbonic acid* in the water-gas to a manageable proportion, and *uniformity* of quality and candle-power in the final product. This view is just as sound now as then; and my investigations were directed, among many other things, to the settlement of these two questions.

II.—THE METHODS AND APPARATUS.

These are essentially founded upon patents granted to T. S. C. LOWE.

The accompanying cut (issued as a supplement to this journal) represents a section of one of the sets of apparatus, of which *four* are erected at Utica, although only two are, at the present season, kept at work; these being more than sufficient to supply the consumption of the town, which, during the month of October, was close upon 120,000 feet per day.

On the left of the cut is represented the gas-generator, 9 feet high and 28 inches in internal diameter, half filled with clean anthracite, broken to rather large "egg size." "P" indicates the man-hole for feeding the coal, almost flush with the second floor of the building on which the attendant stands. The apparatus next on the right is called, by the inventor, the "superheater"—a name which we are obliged to use provisionally, though its functions are but imperfectly expressed thereby, being rather those of a *regenerator*. The dimensions of the superheater are 15 feet in height by 28 inches internal diameter.

The first step in the process consists in blowing up the anthracite in the generator to intense ignition, by means of a blast of air entering under the grate, "g," at the point marked by the arrow. The highly heated gaseous products, consisting of carbonic oxide and nitrogen, pass down through pipe "f," and meeting in "g," another blast of air from the right, kindle again and blaze up through the mass of loose firebricks in the "superheater," heating the latter to an intense temperature. On one occasion during my investigation, one of these columns having been out of use for ten hours, since the last passage of the gas through it, I had an opportunity to view its interior from the top, and found the heat to be still a bright cherry red, near 2,000° F. During the first stage of blowing up the generator, the valve "h," at the top of the superheator, is open, and the blast passes on to the boiler to help make steam.

The second stage is to shut off the air-blast, to close the valve "h," and to introduce steam into the side of the generator, through the small pipe marked "steam," passing down its right hand side.

Water-gas is now formed, and there is simultaneously fed into the top of the generator, trickling slowly in through the small syphon-tubes "m," a certain amount of crude petroleum, of ordinary density, which, vaporized by the heat as it enters, is swept on to, and through the superheator, in which it undergoes gasefaction; and the whole mixture passes on through "n," down to the washer "v," and on to the other arrangements provided for condensation. The amount of gas obtained at each heat is 3,000 cubic feet or more, according to the degree of heat attained, and the average time of each such heat, including both stages of blowing up the fire and generating the gas is one hour; so that 24 heats, or over 70,000 cubic feet of gas can be obtained daily from each apparatus.

III.—THE ANALYTICAL RESULTS.

To obtain a knowledge of the chemical nature of the crude gas, as it issues from the "superheater," I attached one of my newly-invented analytical trains (described in the *American Chemist* for March, 1875). to one of the mains at the point where it bends down to pass to the washer. This point was about 16 feet distant, horizontally, from the superheater (the relative distance being shortened in the cut), but the heat was so intense, that on inserting a chemical thermometer, ranging up to 500° F., through a vulcanized stopper, the rubber soon melted, and the thermometer was broken. A common cork was then tried, with a glass tube inserted through it, through which to draw off the gas. This becoming almost instantly stopped, was found, on being withdrawn, to have become *fused* and collapsed at the extremity; indicating to my surprise a temperatue of at least 1,200° F. in the gas at this point. It was found necessary, therefore, to have an iron tube, about one inch diameter and 40 inches long, screwed into the main, in order to form a connection. The gas was then passed slowly through my apparatus which condenses all the impurities, separa-

ting them into eight separate and distinct constitutents, as set forth in column (*A.*) of the accompanying tabulation (See table). Column (*B.*) represents the figures obtained by the simultaneous application of a similar apparatus to the gas after it had passed the washers, and column (*C.*) the like figures obtained from the same identical gas in a like apparatus attached between the purifying boxes and the station meter. The columns (*A.'*), (*B.'*) and (*C.'*) represent the proportions, in *volumes* per 100, of the different impurities, at these three different stages of the process. I should here state that as these three analytical trains were kept at work during many hours, and throughout the course of a number of successive "heats," these figures represent a just average of the gas as manufactured at this date, October 16th.

TABLE I.

October 16th, 1875.	Crude Gas. (A.)	Condensed Gas. (B.)	Purified Gas. (C.)	Crude Gas. (A'.)	Condensed Gas. (B'.)	urfied Gas. (C'.)
	WEIGHTS. Grains in 100 cubic feet.			VOLUMES. Cubic feet in 100		
	—Temperature Fahrenheit— About 80°.	53°.	56°.			
1. Tar in spray, mechanically suspended	355.29	.....	.....			
2. Water in spray, mechanically suspended	413.95	.....	.....			
3. Condensable tarry vapors with a little naphthaline	942.67	449.82	none.	.337	.211	
Dust of lime, etc..	.....	.....	17.58			
4. Chocolate brown hydrocarbon, or "Soot'	200.33	12.33	none.			
5. Water-vapor.....	1.077.13	688.96	304.53	3.871	2.469	1.092
6. Gaseous Ammonia.....	57.82	5.21	3 52	.184	.017	.011
7. Gaseous Sulphuretted Hydrogen and equivalents	237.82	93.41	18.84	.385	.150	.030
Total Sulphur in gas.....	(227.05)	(87.92)	(17.73)			
8. Gaseous Carbonic Acid.	2,840.33	2,881.87	39.47	3.514	3.550	0.49
Total Impurities.	6,125.34	4,131.60	383.94	8.291	6.397	1.182
Totals without the water...	5,048.21	3,442.64	79 41	4.420	3.928	0.090
Total of Tar and Soot.	1,498.29	462.15				

IV. REMARKS UPON THE ANALYSIS.

A. *The Crude Gas.*—It must first be remarked that the tarry matters in this gas, were separated by the apparatus into two distinct portions, numbered 1 and 3. No. 1, was a thick, opaque, muddy tar, which condensed immediately with the residual steam in the gas, or which is already, no doubt, partly in process of condensation in the main itself, and in mechanical suspension in the gas. It is therefore certain that the figures given, represent only a part of this kind of tar, by reason of the fact stated, that the gas had to be passed through a narrow iron tube 40 inches long, to reduce its temperature before entering the analytical train. This tar must approximate in character to that which condenses in the hydraulic main of an ordinary coal-gas works. The tar No. 3, is that which is more permanently held up by the gas, and this is formed in the second member of the train, continually condensing therein, as a white smoke, and settling to a thin, brown, transparent tarry liquid which was almost free from moisture. The distinction between these two kinds of tar was quite sharp, none of the tar No. 3, forming in the connecting tubes between the first and second tar-flasks of the train, (there having been introduced by me with this train, on account of the high temperature of the gas, *two* tar-flasks instead of the one only, which I have heretofore used when analyzing gas from gas-coal.) We might for convenience, designate the tar No. 1, *thick tar* and No. 3, *thin tar.*

The very small amount of Ammonia in this gas, at once commands attention, being not more than one-fifth or one-sixth of that which occurs in crude gas from an ordinary gas-coal.

The sulphur is also very small compared with ordinary crude coal-gas, being about one-third the amount in that from a first class Westmoreland coal, and not more than one-fifth of that I have found in some West Virginia gas coals. The amount of carbonic acid, as was to be anticipated, rises much above that which is found in gas from gas-coal, but not so much so as to render purification by lime, more than ordinarily difficult.

B. *The Condensed Gas.*—It is not to be expected, that when, operating upon a gas of so novel an origin and composition as this, the true mode of handling it, in the operations of condensation and purification, could be "jumped at," at once; and indeed, when the circumstances are considered, it must really be regarded as matter of surprise, that so good an approach to a correct mode of condensation has been arrived at already, as is revealed by the analysis. No doubt all the *thick tar* No. 1, remains in the washer "*v*," represented in the cut, and which acts as a sort of hydraulic main. The apparatus "*y*," a cold-water-scrubber, is accountable, therefore, for the separation of some *seven grains* of the 11.5 grains per cubic foot of the tar and soot, which, with the little naphthaline present, it should be the main object to rid the gas of in this stage of the process. This cannot be regarded as a very successful operation. It fortunately happens that these figures admit of a somewhat direct comparison with some others recently obtained by me in investigating the action of the new form of tar scrubber (St. John's), now in use at the Harlem Gas Works. This is a sort of *gas-strainer*, in which the gas is strained through the tar itself, as it condenses. The amounts of tar, soot and naphthaline, in the crude gas, as it came from a main connected with the general hydraulic main,—part of the tar having, of course, been already condensed the coal used being very rich gas-coal from West Virginia—are given below, with the amounts after passing the St. John apparatus in grains per 100 feet.

	Before condensation.	After condensation.
Tar	515	44.
Naphthaline.....	123 5	25.
Soot.....	266	56.
Totals.....	904.5	125.
Percentage condensed.....		86 2

In the case at Utica the percentage of tar and soot condensation, by cold-water scrubbing, was but 59.5 per cent. in all.

But this is not the whole story. The flow of gas through the St. John apparatus, at the time of my analyses, at Harlem, was some 20,000 feet per hour, or at least, four times that through the Utica scrubbers. In this connection it should be considered that one main function performed by cold water condensation, as is now well understood by practical gas men, is the complete separation of ammonical compounds, which in this gas are present in so small proportion, as to eliminate this element from the question.

The same remark applies, to some extent, to the sulphuretted hydrogen, which is also present in much smaller proportion; and it would appear that this, as well as the ammonia, might very safely be left to the purifying boxes, instead of being largely dissolved out by cold water, as it is here, at the expense, without doubt, of considerable candle-power, lost by a solution in the water, of some soluble hydrocarbon gases.

A small proportionate *increase* is observable in the carbonic acid during the condensation, which seems to indicate, almost beyond dispute, that hydrocarbon gases are present, which are rather more soluble in cold water than carbonic acid gas itself. In connection with this subject of condensation, however, I must not fail to refer to the fact of the very high initial temperature of this gas. If cold water scrubbing be disused, some process of condensation must be substituted, having a good refrigerating action upon the gas, though it does not appear to me essential that it should be brought down altogether to the temperature of the air, before passing into the purifiers, if the *tar condensation* can be accomplished without such refrigeration.

The Sooty Matter.—An important bug-bear, that has haunted gas-circles, in connection with the use of petroleum as a gas-material, is completely laid at rest by these analyses, especially when considered in connection with the figures above quoted from the West Virginia gas coal at the Harlem gas works. I refer to a subject of common report, credited by many not familiar with the facts, that in all gas made from petroleum a special amount and kind of *lampblack* or *soot* is inherent, which it is impossible to separate altogether, by any mode of condensation, or even of purification. It was found, however, that in this process at least, the amount of sooty matter is less in proportion than with the coal-gas, being about 2 grains per cubic foot against 2.7 grains; and it will be observed, moreover, that in the condensation, there was a very much closer separation of the petroleum soot than of the gas-coal soot, about 94 per cent. against 79 per cent. The residual soot in the condensed gas was entirely separated in the lime-boxes, staining the lower tiers of trays quite brown. An interesting fact is the somewhat light chocalate-brown color of this peculiar hydrocarbon, while the soot from the coal-gas was nearly black, like ordinary chimney soot.

C. *The Purified Gas.*—The dust, doubtless of lime, observed in this, was due to the close proximity of the purifiers. Such dust soon settles in great part in the holder and mains. An interesting fact, here, is the large amount of water lost by the gas during the purification, about 3475 grains or nearly half a pound of water per thousand feet of gas; as at this time the lime was purifying about 5000 ft. to the bushel, it is evident that there was considerably more than a quart of water per bushel, taken up by the lime in the purifiers, nevertheless the lime, when the boxes were opened, seemed *drier* than when put into them. Samples for analysis were secured of the lime, when put in and when taken out, which there has, as yet, been no opportunity to analyze. Analyses of these samples will, doubtless, throw valuable light on the nature of the gas, and upon questions which arise regarding its purification.

The sulphur shown in this column, 17.73 grains, must not be understood as altogether due to imperfect purification. It was found that in this gas, when it no longer stained lead-paper in the least, a little sulphur, possibly existing as bisulphide of carbon, was still taken up by the new re-agent used by me (crystalized sulphate of copper). It is, however, necessary to state further that a portion of this 17.73 grains of sulphur—how much is unknown—was due to the purifying boxes having begun to foul (a little sooner than was expected), *during the progress* of this analysis, which latter had then to be suspended, until a change had been made to another box. The same remark applies to the carbonic acid found (about one-two thousand of the volume of the purified gas), which appeared only (as could be visibly seen) during the early part of the analysis, before the approaching failure of the purifier had been discovered. Unfortunately there was no time left to repeat the analysis on this occasion, and it must, therefore, be presented as it is, with this appropriate explanation. It may be sufficient to state that the gas, during the proper working of the purifiers, failed to respond to the ordinary tests for sulphur and carbonic acid,

and that from October 1st to 16th, inclusive, the average amount of gas thus purified was very closely 5000 cubic feet per bushel of slacked lime.

V.—STATISTICS OF MATERIAL AND PRODUCTION.

Through the courtesy of your Superintendent, Mr. W. P. FISH, I was allowed free access to the books and records of the office and the figures extracted by me were subsequently revised and endorsed by him, at my request, as correctly noted and computed. This furnishes me most exact and satisfactory means of estimating the amount of materials and labor required. I understood that it was only since some time in the month of August, that the present arrangements, applied for condensation and purification, had been perfected, and I judged it unnecessary, therefore, to go back further than Sept. 1st. During that month the record foots up *weekly* as follows :—

September, 1875.	Oil; gallons.	Coal; pounds.	Labor; dollars.	Make; cubic feet.
1st to 7th inclusive.....	2.166	43.389	$60.09	710.900
8th " 14th "	2.080	44.024	60.09	623.400
15th " 21st "	2.156	51.315	60.09	710.000
22nd " 28th "	2.317	50 407	60.09	755.900
29th " 30th "	758	13.900	17.19	250.400
Total 30 days	9.477	203.035	$257.55	3.050.600
Average per day.	315.9	6.767.8	8.55	101.387
Per thousand ft. of Gas.	3 107	66.56	0.0844	

Of the above anthracite, the amount used for steam-making alone, was 63,722 lb. or 31.38 per cent.. leaving, as the consumption of anthracite in the generator for heating it and making the gas, 139,313 lb., or 45.66 lb. per 1000 feet of purified gas. The amount of lime used during September was 874 bushels, costing ten cents per bushel, and the labor in the purifying department cost $38. This makes the cost of purification, during September, 4.11 cents per thousand.

During the first 16 days of October, during and up to the time of closing my examinations and analyses, the figures were as follows :

	Oil.	Coal.	Make.	Lime Slacked.	Labor in Purification.
	6.021	122.378	1.893.500	384 bush.	$14.25
Per 1000 ft.	3.15	64.63		0.204	0.75.3

According to this a great and rapid advancement appears in the management of the purification, the cost per thousand, for labor and time together, being but 2.783 cents. There appears no reason, so far as I could ascertain, why this low cost of purification should not be maintained.

Cost per thousand in the holder.—Of course this will vary somewhat with the varying cost, in different localities, of the materials used and of the labor employed. From the data already given, each reader must make his own estimates.

VI. CHARACTER AND QUALITY OF THE GAS.

The beauty and brilliancy of this gas was a common topic of observation and remark in Utica. During my last visit, continuing a week, I was enabled to observe the effect of the gas when reading and writing by it nightly ; and at all hours of the night, in my room at the hotel, and am able to bear complete personal testimony to its power, uniformity, and satisfactory character generally. The temperature of several of these nights was below freezing ; and in one of them snow fell, but I could observe no effect on the gas-light.

In determining the candle-power of this gas, I used the standard candles which I had used previously, one of which burned very closely to 120 grains per hour. I weighed the candle on one of my own delicate chemical balances, of BECKER's make, using a fine set of analytical weights, and used a *disc* which I made myself and had practised with. The meter used was also one I took with me to Utica and which was, moreover, tested carefully by Mr. W. P. FISH, and corrected accordingly. The timepiece used was also verified. The general result was, that I satisfied myself, that the value of this gas, during the period of the analyses, was *nineteen* and a *half* (19.5) candles for five cubic feet per hour.

Density.—This was carefully determined by Mr. FISH and myself, and found to be, mean of three determinations, .571. This is remarkably low for a gas of this composition and origin, and would appear to indicate that the petroleum must be, at least, partially converted by this method into gases of a lower density than are usually obtained from it. The water-gas itself will not probably be admitted to contain less than 33 per cent. of carbonic oxide, of density= .9674, which will make its density=.553 (the same as that of pure marsh gas) ; and as the additional volume derived from the petroleum, which is adequate to raise the illuminating power to near 20 candles, can scarce be less than 10 per cent. of the whole, this additional volume, on this supposition, would have a density=.933, a little under that of ethylene (olefiant gas). Of course to clear up all these questions, complete eudiometric analyses will be needed ; but, for the present, so far as immediate practical points are concerned, these may be dispensed with. This density, .571, is equal to that of some gases from cannel coals. Under the same pressures, the flow of this gas will be some 12 or 14 per cent. slower than that of thin gases of density about .42, and candle-power about 15, from caking gas-coals. To produce the same velocity of flow, a somewhat heavier pressure, on the distributing system, is necessary.

Much having been said and assumed about the extremely deleterious character of water-gas, and of all gaseous mixtures containing it, over and above ordinary coal-gas, I was much interested in taking the opportunity here offered to procure some practical testimony on the subject from the employees, several of whom I questioned in such manner as to elicit the needed information, without their apprehending my object. I was surprised to find among the men constantly exposed to the inhalation of the pure water-gas itself,—those employed in feeding and manipulating the generators, whose work was often immediately over the opened generators,—I could obtain no support for the universal opinion as to the necessarily baneful action of the water-gas. These men had observed a little headache and vertigo, when they had *first* exposed themselves to the inhalation of the gas in this way, but "in a few days it wore off, and they never observed it now." At no time, as they assured me, had their appetites, digestion, sleep or strength been diminished appreciably. Their appearance of good health was confirmatory of their statements. I would, however, make the obvious reservation, that this is only *negative* evidence, and would not justify rash exposure to this gas without care and precaution. It may be that men *in health* are not affected by it, while those having certain organic disturbances, say of the heart, might be dangerously affected.

One man, employed in the street-department in tapping mains, deposed to having vertigo and palpitation when he inhaled the gas. his description of the symptons reminding me, however, rather of those of an anæsthetic agent, like ether. He said it made him "feel drunk." These effects may have been, in part at least, really anæsthetic in their character, and due to the petroleum products. This man, moreover, asserted that his appetite, sleep and general health were not influenced in any way by such exposure.

VIII.—GENERAL CONCLUSIONS.

1. The Lowe process, as operated on an ample working scale—120,000 cubic feet of gas per day—at Utica, constitutes an exceedingly *compact* and *efficient* apparatus, occupying very small ground-space, for evolving water-gas from anthracite coal and steam, with surprising rapidity.

2. The average amount of *carbonic acid*, in the completed illuminating gas, is reduced by this method to three and a-half per cent., a proportion readily manageable by ordinary lime purification.

3. The practical result is a complete and reliable *uniformity of quality* of the gas, for weeks together, quite comparable with that obtained in a well-regulated ordinary coal-gas works.

4. The amount of *gas-tar* produced per thousand feet of finished gas, is but one fourth that from gas-coal.

5. The amount of sulphur in the finished gas is but one-third that from a first-class gas-coal, and hence, notwithstanding the larger proportion of carbonic acid, complete purification with lime is not more troublesome or more costly than in the case of a good gas-coal—one bushel of slacked lime, purifying about 5,000 cubic feet of gas.

6. The amount of ammonia is but one-fifth that in coal-gas and hence the fouled lime from the purifier is very much less offensive and troublesome than in the case of coal-gas.

7. The amount of naphthaline is small, and cannot, with proper tar-condensation, give rise to any trouble.

9. Enrichment with about three gallons of petroleum to the thousand feet of gas, furnishes, by this method, a perfectly permanent gas of between nineteen and twenty candle-power ; and it is probable that if the tar-condensation can be effected without contact with cold water, a somewhat less proportion of oil may give the same illuminating value.

10. The current cost of nineteen and a-half candle-gas delivered into the holder, inclusive of all labor and materials (not inclusive, however, of interest, salaries, taxes, repairs, &c.,) is admitted to involve a saving of at least 35 per cent. over that of gas from gas-coal of a much inferior quality and smaller actual money value to the consumer.

11. The density of this 19 to 20 candle-gas was not above .571, comparing well with some cannel gases of but little higher candle-power.

12. So far as could be judged, from the absence of testimony to any poisonous or morbific action of this gas, at least upon men in good health, the anticipated importance of the objections to water-gas on this score, would appear to have been much exaggerated.

13. I must, finally, sum up by expressing with emphasis, the gratification with which I have recognized the solid progress that is made by this successful process, in realizing what I have long awaited as a real step in the arts of civilization—the cheap manufacture of combustible gas from carbon and steam.

12 HUDSON TERRACE, Hoboken, N. J., }
Nov. 1, 1875. }

Nova Scotia Coal Production.—H. G. POOLE, Esq., Government Inspector of Mines sends us the following report of the Nova Scotia coal trade for the first nine months of 1875, as compared with 1874 :

Markets.	Tons.	Same period 1874.
Nova Scotia :		
Land Sales..... ...	36,693	37,166
Seaborne. 112,626		112,483
Total.....	149,319	149,649
Quebec 165,075		145,923
New Brunswick.....	57,284	54,489
Newfoundland.....	42,577	40,223

Markets.	Tons.	Same period 1874.
P. E. Island	31,908	32,184
United States	64,981	123,965
East Indies.....	1,003	
West Indies	5,669	22,589
South America.....	3,050	595
Europe	497	2,272
	521,363	571,889

RECAPITULATION.

	Tons.	Same period 1874.
Cumberland County...	40,080	35,157
Pictou.....257,208		280,758

	Tons.	Same period 1874.
Cape Breton.....221,336		252,812
Victoria.....	2,739	3,162
	521,363	571,889

The above shows a total decrease this year of 50,526 tons, as compared with the business for the corresponding nine months of 1874. This amount was more than made up by the decline of 58,984 tons in the shipments to the United States, while there was a decline of 16,920 tons in shipments to the West Indies.

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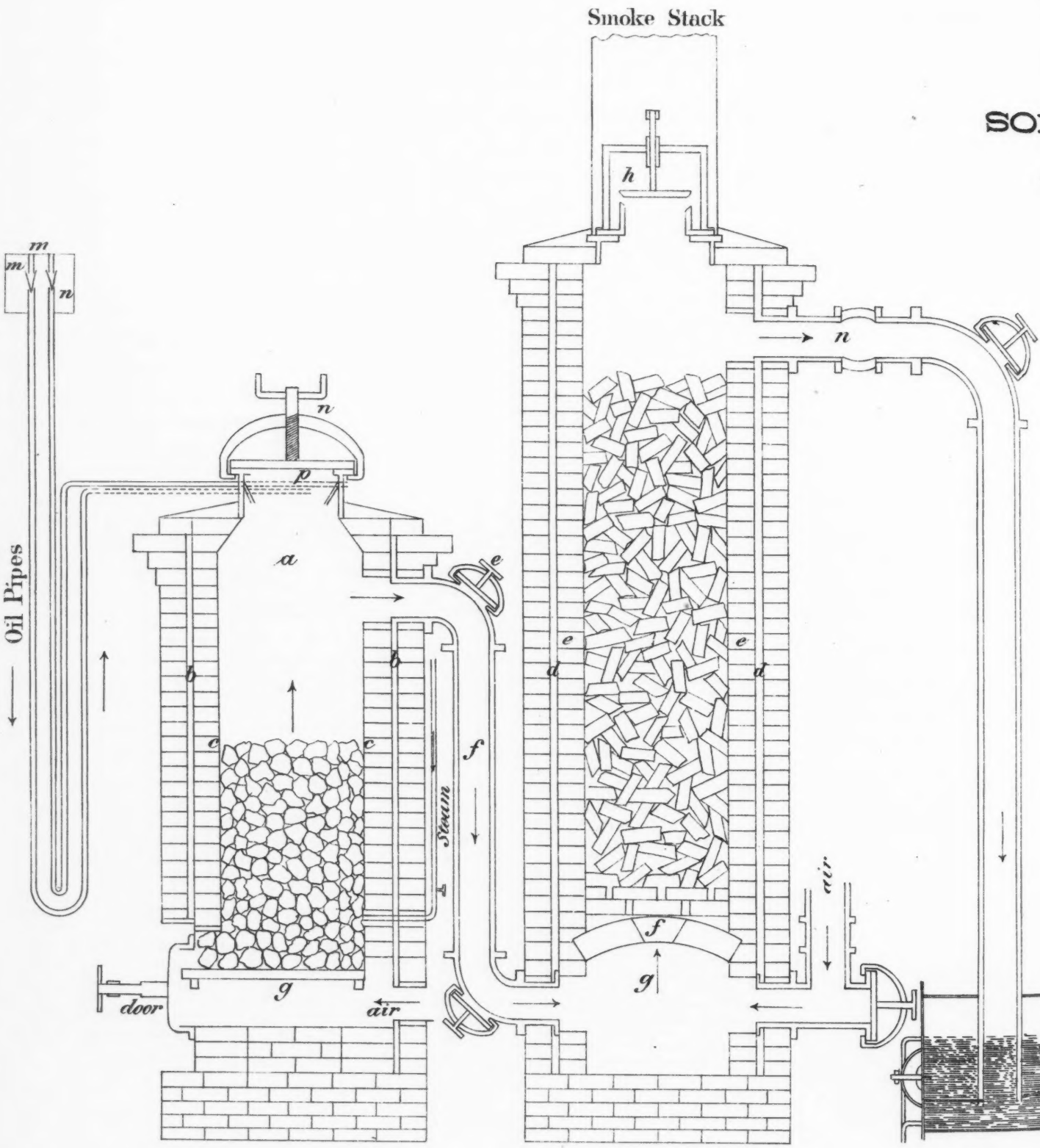


GENERATOR. SUPERHEATER. WASHER.

WES IMPROVED GAS APPARATUS.

S A. STEVENS & CO.,

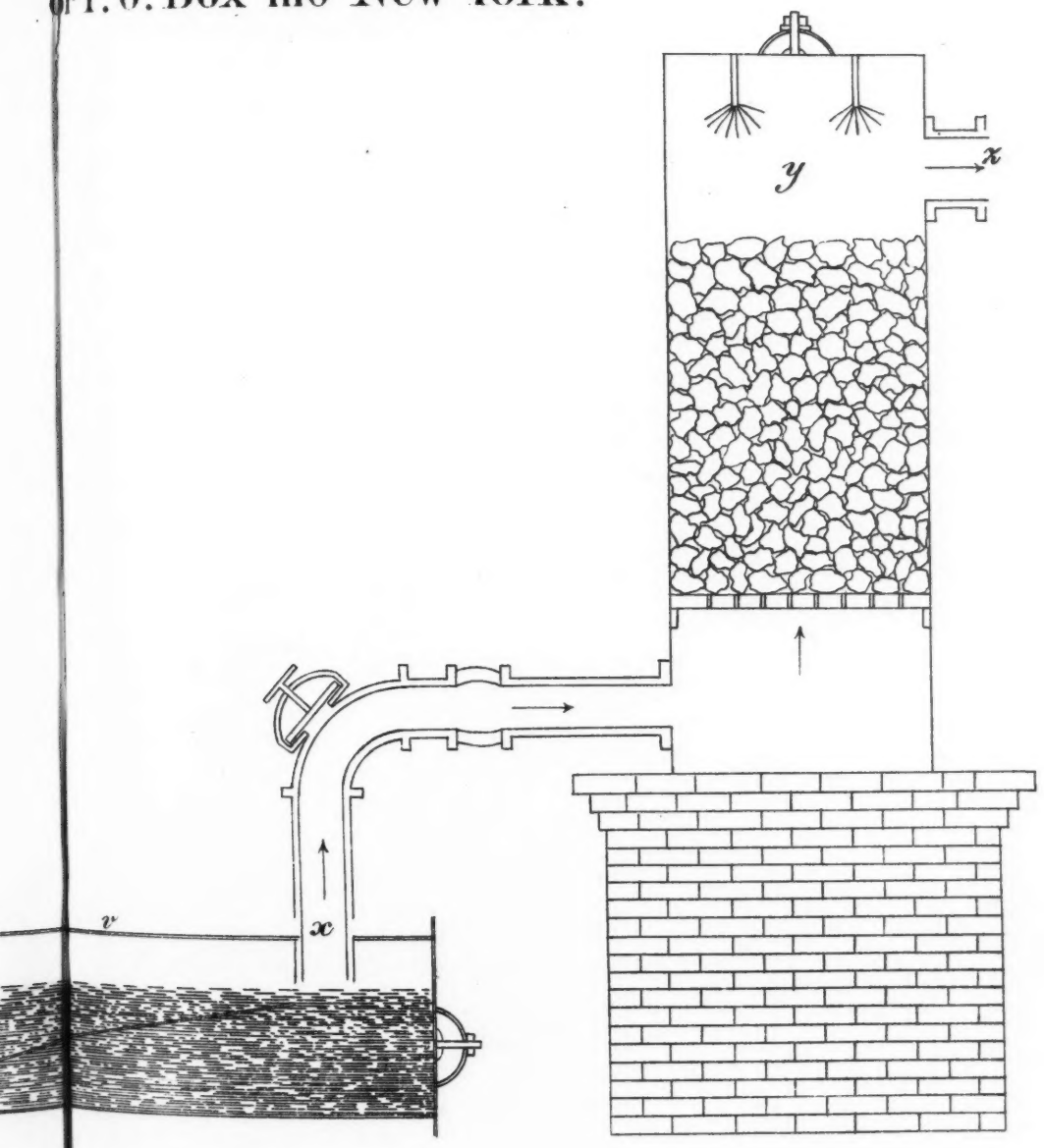
E AGENTS AND BUILDERS

30 Walnut Street, Philadelphia Pa.

and

Coal & Iron Exchange, Courtlandt St.

or P. O. Box 1110 New York.



WASHER.

SCRUBBER.

OPERATION.

The Generator is kindled through door at base, charged with Anthracite from top and closed, the valve at top of Superheater being opened and outlet at right of same closed.

Blast is applied below grate bars of Generator, which, passing upward through same and downward by connecting pipe, enters base of Superheater and passes upward through the perforated arch and the mass of loose fire-brick out into smokestack.

The gases thus carried from the coal into bottom of Superheater are there met and ignited by an air blast, evolving an intense heat.

When the Anthracite is at cherry red, the second chamber is white hot.

The blast is then shut off, top of Superheater closed, and its outlet opened. Hot steam is introduced below into the incandescent coal, while crude petroleum, led through trapped pipes, is simultaneously dropped thereon from above. The resulting gases pass off together into and through the superheated fire-brick, by contact therewith being made permanent, and thence go through Washer, Scrubber, &c., to Holder.

NEW PUBLICATIONS.

EXTRACTS FROM A REPORT ON THE LA BASTIE GLASS. By T. EGLESTON. New York, 1875.

This pamphlet contains a mutilated record of Prof. EGLESTON's experiments with the "annealed glass" of M. DE LA BASTIE. We regret to say that the introduction of so many asterisks has seriously injured the value of the document. The reader is perpetually wondering whether some of the matter omitted is not unfavorable to the product, which all the matter printed so harmoniously praises. So far as the experiments here made public are concerned, they are more satisfactory with relation to shocks, pressures, strains, etc., than with relation to heat. It is true, Prof. EGLESTON is made to say that this glass is certainly the best non-conductor of heat that he knows of; but this sweeping dictum is not supported, in our judgment, by the experiments given. Prof. EGLESTON does not seem to have made, or his clients have not chosen to publish, really accurate experiments on this point. By boring a hole through the center of a circular glass plate, covering the plate with a sheet of wax, and exposing it to the heat of a platinum wire passed through the central opening and kept glowing by a steady electric current, the rate of transmission of heat could have been determined, and a measure of comparison obtained. The popular experiment at the Cooper Institute, narrated in this pamphlet, consisted in heating the center of a glass plate 18 inches square, for five minutes, at the end of which time this portion was red hot and had bulged from the force of the flame, while the glass was "perfectly cool within four inches of the spot where the flame struck it." It is further remarked that after five minutes the temperature at the center was still so great that the hand could not be comfortably borne within three inches of the glass, and that at this period the glass began to crack and broke in five minutes more. Evidently this test involved relations of conduction, radiation and expansion, all at once; and unfortunately it does not prove anything definite as to any one of them.

But the report, in its present form, is of a commercial, rather than scientific, character; and we presume that the portions omitted by the proprietors in publication have a commercial, rather than scientific, bearing. So far as we can learn, the owners of the La Bastie process have seriously endangered their own interests in this country, by demanding an exorbitant price for the invention. At a low royalty, it might have been regularly adopted by manufacturers; but the enormous claims of its proprietors have merely set everybody experimenting to make the same thing in some other way; and we shrewdly suspect that there will be found innumerable ways to do it. For, in spite of the anxiety of its representatives to make it out an unheard-of and astonishing thing, (in which they are aided a little, we must confess, by the slightly marvelling tone of Prof. EGLESTON's report), this toughened glass is no more mysterious in its properties than toughened steel or iron; and there is likely to be found no more special virtue in this or that liquid, used as a bath for the purpose, than in the numerous patented liquids for tempering steel—the whole secret in both cases being one of initial temperature and rate of cooling. Possibly Prof. EGLESTON has pointed out something of the kind to his clients—and hence these asterisks.

To which remarks we append an asterisk on our own account, to indicate that we might say more, but stop for the same reason that EGGLESTON stopped heating his glass (p. 13), viz., "on account of the fatigue of producing the blast."

*

STATISTICS OF COAL PRODUCTION.

Duties.

Anthracite free, *Bituminous*, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c. gold.

Not otherwise provided for, per ton, 40c. gold.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Nov. 13.

	1875.		1874.	
	Week.	Year.*	Week.	Year.
Wyoming Region.				
D. and H. Canal Co	64,792	2,655,057	47,543	2,084,459
D. L. and W. RR. Co	64,007	2,933,927	53,124	2,187,457
Penn. Coal Co	26,401	1,200,243	26,322	1,166,451
L. V. RR. Co	21,323	817,871	20,488	832,023
P. and N. Y. RR. Co	660	83,593	1,494	55,73[illegible]
C. RR. of N. J	50,572	1,238,488	40,657	1,309,004
Penn. Canal	11,691	277,106	10,226	306,154
Lack. and B. RR.	..	81,493	..	112 529
	239,446	9,237,778	199,854	8,054,615
Lehigh Region.				
L. V. RR. Co	86,079	1,827,937	75 808	2,825,936
C. RR. of N. J	37,559	652,307	29,200	1,038 550
D. H. and W. B. RR.	1,994	73,506	951	36,995
	125,432	2,553,750	105,959	3,901,481
Schuylkill Region.				
P. and R. R. RR. Co	179,703	4,082 462	162,134	4,720,718
Shamokin & Lykens Val.	28,389	1,079,973	18,311	845,559
	208,092	5,162,43[illegible]	180,445	5,566,277
Sullivan Region.				
Sul. and Erie RR. Co	893	9 030	536	31,391
Total	573,865	17,012,993	486,794	17,553,764
Increase	87,069	..	..	..
Decrease	..	540,771	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

The following Table does not give the entire production of our Bituminous mines, but it is by far the fullest report published.

The Production of Bituminous Coal for the week ending Nov. 13, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	50,376	2,053,266
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,831	290,591
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	4,299	188,034
*East Broad Top	1,292	41,528
Clearfield Region, Pa.		
*Snow Shoe	967	53,567
*Tyrone and Clearfield	19,970	759,498
Allegheny Region, Pa.		
*Pennsylvania RR	3,707	190,158
Pittsburgh Region, Pa.		
*West Penn. RR	4,576	188,129
*Southwest Penn. RR	860	20,175
*Penn. & Westmoreland gas coal, Pa. RR.	14,967	607,013
*Pennsylvania RR	8,550	372,365
Kanawha Region, W. Va.		
†Chesapeake and Ohio RR	4,311	156,053

* To Oct. 28. † Nov. 6.

The Production of Coke for the week ending Nov. 7.

Tons of 2000 lb.	Week. Tons.	Year. Tons.
Tyrone and Clearfield	..	285
Alleghany Region	..	58
West Penn. RR	802	43,407
Southwest Penn. RR	9,945	471,961
Penn. & Westmoreland Region, Penn. RR.	550	30,563
Pittsburgh, Penn. RR	3,419	95,441
Total	14,716	641,715

The receipts at Port Richmond for the week were 60,000 tons, shipments 60,000 tons, and balance on hand 153,000 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Pennsylvania Railroads amounts to 75,241 tons.

The Exports of Coal from Baltimore for the week were 500 tons, and for the year, 34,054 tons as compared with 63,366 tons to the corresponding time in 1874.

Receipts of Coal at Boston, for week ending Nov. 5, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1875. Tons.	1874. Tons.
Alexandria and Georgetown	1,381	28,380	35,796
Philadelphia	7,936	191,259	158,320
Baltimore	1,530	39,468	45,140
Other places	2,170	80,147	66,355
Great Britain	—	704	1,270
Nova Scotia	1,260	9,294	11 355

Shipments from Pictou, N. S., for the week ending Nov. 6:

	Tons. Week.	Year.
To United States	2,260	26,104
" West Indies	823	3,971
" South America	—	4,772
" Canada	4,200	136.233
" Other Provinces	2,857	63.005
	10,140	234,085

Belvidere Delaware RR. report:

	Week.	Year 1875.	Year 1874.
Receipts of coal at Coal Port (Trenton)	9 247	167,833	254,432
" " " South Amboy	9,549	222,601	550,025
Shipments of Coal Port (Trenton)	9,642	154,089	252,938
" South Amboy	11,228	295,057	562,349

Shipments from Block House, Cow Bay, C. B., to the following destinations, from Oct. 25 to Nov. 5, 1875:

	Week.	Year.
Provinces	321	7,360
West Indies	—	1,393
United States	—	11,039
	321	19,792

The following is a description of the coal shipped:

	Tons.
Round coal	19.527
Slack	250½
Coke	14½

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 12, 1875.

Anthracite.

There is a general acknowledgment of a falling off in the demand for anthracite coal, although the fulfillment of such orders as the companies have on their books, is restricted by a great scarcity of vessels. There is still much anxiety on the part of some buyers who are located at ports which are usually closed during the winter, to have their supplies promptly furnished; but, as a rule, this trade is well supplied, and hereafter the demand from all sources will be the usual limited one, which always prevails during the winter months. The present demand is mostly confined to stove and chestnut sizes, with some companies booked away ahead, and others not full of orders for these sizes. As will be seen further on, the output last week was very large. Stocks, however, have not increased much. The Reading Company reported a stock of 153,000 tons at Port Richmond, on the 13th instant. A week before they reported a stock of 195,000 tons, though, we are informed, there has been no reduction of stock.

The Production of anthracite coal for the week ending November 13, was 473,863 tons, and from January 1, 17,012,993 tons. The production for the corresponding week of 1874 was 486,794 tons, and from January 1, 1874, 17,553,764 tons. The production for the week ending November 6, 1875, was 460,462 tons. From the above figures it will be seen that there was an increase in the production of last week, as compared with the previous week, of 113,401 tons, and 87,069 tons, as compared with the corresponding week of 1874. There has been a decrease since January 1, as compared with the corresponding period of 1874, of 540,771 tons.

C. B. Conant & Co., 111 Broadway, have submitted a statement showing that their nominal assets are $110-863.71, and their assets available, $79,049.81. Their liabilities are $89,401.64 on the open account, $244,613.92 on account of endorsements and contracts, and $21,124.68 on account of drafts.

The Philadelphia *Ledger* of Nov. 15, says: "A special meeting of the Schuykill Coal Exchange was held in this city on the 8th instant, when it was determined—First, to hold a stated monthly meeting of the Coal Exchange to fix line prices, and that all members having any knowledge of any other member violating the rules and by-laws of the association, be requested to make public such information, with the names of the parties; second, that an expert be employed, upon the request in writing of any member, charging another member with underselling, etc., to examine the books of the member so charged and to report the facts; third, the books of the selling agents to be subject to like examination; and fourth, that the members of the Coal Exchange will discharge any agent who may divide his commissions with a purchaser or in any manner sell coal in violation of the by-laws."

Sales Agents are very progressive, and we doubt if the above resolution will do much to check the practice of underselling, or even aid in collecting enough evidence to convict anybody of such a thing. There always appears to be some plan by which underselling can be done, let the precautions taken be what they may.

Bituminous.

There is a very fair demand for Cumberland coal, it has indeed increased very much as compared with a month ago. There is a steady demand for Clearfield coal, although it is not equal to the ability to produce, hence trade is called dull, although the shipments last week were nearly 50 per cent. greater than for the corresponding week of 1874. Prices for all descriptions of bituminous steam coals are low and irregular.

The Baltimore and Ohio Railroad Company's Report.—The report of this road for the fiscal year ending with September was given to the public early this week. It shows a deficiency of 258,739 tons in the coal tonnage as compared with the year previous. This is accounted for by the general depression in manufacturing. Let us see if this was actually the cause. The production of steam coals entering the same markets as those which pass over the B. & O. R.R. from January 1st show the following increase and decrease as compared with the corresponding period of 1874:

	Decrease. Tons.	Increase. Tons.
Cumberland	75,241	
Broad Top	11,414	
East Broad Top		41,528
Snow Shoe		594
Clearfield		215,521
Allegheny		9,715
	86,655	257,358
Nett increase		170,703

The above shows that, although the manufacturing and shipping interests of the East have been very much depressed, and our foreign shipments have fallen off, yet there has been a very considerable increase in the consumption of bituminous steam coal.

Although the shipments of Cumberland coal show a falling off of only 75,241 tons, the amount sent via the B. & O. R.R. shows a much heavier decline, while the other outlets show an increase as follows :

	Increase. Tons.	Decrease. Tons.
To Baltimore & Ohio R.R		240,813
" Chesapeake & Ohio Canal	90,248	
" Pennsylvania R.R	75,324	
	165,572	240,818

By the foregoing it will be seen that, from the encouragement the Pennsylvania Railroad has given to the coal interest, it has increased its business in steam coals 321,268 tons, while the B. & O. RR. shows a decrease of 240,813 tons. It is very evident that the decrease in the B. & O. RR. Company's coal tonnage is due to want of liberality rather than depression in trade, and we would suggest that, in their war with the Pennsylvania Railroad, they fought for the shadow and let the substance go.

A comparison of the existing rates of freights will explain the increase in shipments via the Chesapeake and Ohio Canal.

From Lonaconing via Piedmont and B. & O. RR. to Baltimore :

C. & P. RR. to Piedmont (say, 8 miles at 4c)	.32
Use of cars of B. & O. RR. on C. & P. RR	.04
Freight on B. & O. RR. to Locust Point (ton of 2240 lb.	2.69
Shipping expenses at Baltimore	.20
Total charges	$3.25

Via Chesapeake and Ohio Canal to Georgetown :

C. & P. R.R. to Cumberland (say) 26 miles at 3c	.78
C. O. Canal tolls and Cumberland shipping charges	.51
Freight on C. & O. Canal	1.05
Shipping expenses at Georgetown	.20
	$2 54
Difference in favor of canal	.71

The experience of this year shows that sea-going rates of freight have ranged no higher from Georgetown than from Baltimore; also, that coal shipped from Georgetown answers the purpose of consumers as well as that shipped from Baltimore. Such being the case, the B. & O. Company will have to make a very large reduction in its freight rate, to regain this portion of their trade; and, at the same time, there are indications that the cost of shipping by canal will be even less next year than at present. There is no doubt that the B. & O. RR. can make a reduction sufficient to meet all competition, and that it would, in the end, find it a profitable movement.

Cumberland coal has an excellent reputation for steam purposes, and unless special inducements were offered on other bituminous coals, they would not take its place; but, during the past year, coals of great merit from other fields have been largely introduced, and they will, probably, with the practical encouragement of the Pennsylvania Railroad, hold much of the trade they have secured. To maintain the supremacy of Cumberland coal, the Cumberland and Pennsylvania Railroad should offer considerable concessions from its exorbitant rates of freight, both on shipments to canal and to the B. & O. RR. By an increased tonnage, and a little more attention to economy in mining, there is no doubt that the profits of the Consolidation Company could be well maintained, even under a heavy reduction in the rates of freight on the Cumberland and Pennsylvania Railroad. With fair encouragement there is, certainly, a grand future before the Cumberland and Pennsylvania bituminous coal trades.

Freights.

Vessels are scarce at all the shipping ports, and, in most instances, the rates of freight have advanced.

Philadelphia Coal Trade.

PHILADELPHIA, NOV. 18, 1875.

There is very little to be said about the coal trade here. New orders are excessively scarce and the accumulation of coal rapidly increasing. The mathematician of the Reading R.R., who exhibited such wonderful results last year, seems to be at work again. We were informed two weeks ago that there was 195,000 tons on hand at Port Richmond, and were told last week that 60,000 tons were received since, and 60,000 tons shipped, leaving 153,000 tons. At that rate the more received and the less shipped, the less wil be left on hand, and, therefore, there is a fair prospect of the present stock disappearing very soon.

Freights are stiffening daily for the East. Boston rates are now firm at $2 to $2 10, and Rhode Island, $1 60. Many of the Captains are anxious to go South, but that market is well supplied and most of them have to go light.

There is a little activity in broken coal, caused by the Government sending supplies to Port Royal, Key West, and other ports handy to Cuba.

Wholesale Prices of Anthracite Coal for Nov. f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
*Lackawanna and Scranton at Rondout and Hoboken	5 05	5 15	5 25	5 65	6 10	4 95
‡Pittston at Newburgh	5 05	5 05	5 15	5 40	5 90	4 85
Wilkesbarre at Port Johnston	5 05	5 15	5 25	5 65	6 10	4 95
Plymouth, R. A., *Net*	....	....	5 25	5 65	6 10	4 95
Susque. Coal Co. at Amboy W.A.	5 05	5 15	5 25	5 65	6 10	4 95
Kingston at Hoboken	5 05	5 15	5 25	5 65	6 10	4 95
Lehigh Coals.						
Old Company at Port Johnston	5 55	....	5 55	5 65	6 10	5 10
Old Company's Room Run "	5 55	....	5 55	5 65	6 10	5 10
§Sugar Loaf, Hobok. &Amb."	5 55	....	5 55	5 65	6 10	5 10
Lehigh Coal Exchange "	5 55	....	5 55	5 65	6 10	5 10
Honey Brook Lehigh	5 55	....	5 55	5 65	6 10	5 10
Spring Mt. C. Co. at Hoboken	....	....	....	....	....	....
Beaver Meadow at South Amboy	5 55	....	5 55	5 65	6 10	5 10
†**Schuylkill Coals at Port Richmond.**						
Schuylkill white ash	4 55	4 65	4 75	5 15	5 60	4 45
Schuylkill red ash	....	....	5 05	5 25	5 65	4 45
Shamokin white and red ash	....	....	....	5 40	5 80	4 50
Lorberry	....	....	5 90	5 90	5 90	4 65
Lykens Valley	....	....	6 50	6 50	6 50	5 50

Per ton.

Freight from Hoboken and Weehawken to New York .... 40c.
" " Elizabethport & Port Johnston to N. York. 45c.
" " South Amboy to New York ..... 50c.

*Freight on Lackawanna coal from Rondout to New York, by boats or barges of the D. and H. Canal Co. 50c. per ton, the expense of towing vessels from New York harbor to Rondout and back will be borne by the Company.

† Freight from Port Richmond to New York (free of discharging) 85c. per ton.

‡ Prices to the Trade.

§ By Canal at New York, Jersey City and Brooklyn, 30c additional alongside.

Schuylkill coal is delivered f.o.b. of boats in New York harbor at 5cc. per ton additional to these rates.

Pittston coal is delivered to carts in New York or Brooklyn at 65 cents per ton in addition to the above rates.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$5 20	$6 50
" " at S. Amboy	6 00	6 50
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	..
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	5 00	6 50
Despard, West Va.,	5 00	6 50
Murphy Run, West Va., at Baltimore	4 75	6 50
Fairmount, West Va., " "	4 75	6 50
Newburgh Orrel, Md. " "	4 75	6 50
Cannelton Cannel, W. Va., at Richmond.	9 50	11 00
" Splint, " "	5 00	6 50
Peytona Cannel, " "	9 50	11 50
Straitsville " at Sandusky, O	3 25	10 00

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	10/6@12/9	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	47/	18 00@20 00
" Gas Cannel "	32/	6d 13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	5 50
Caledonia, at Port Caledonia	1 75	5 25
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou	2 25	5 75

Steam and House Coals.

Broad Top, at the mine, $1 25; at Amboy	4 75@5 00	5 25@5 50
Cumberland, at Georgetown and Alexandria, Va	4 00@4 25	5 25@5 50
Cumberland, at Baltimore	4 25@4 35	5 75@6 00
Clearfield and Allegheny, "Derby," "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, $1 00; at Greenwich, Phil.	4 65	5 65

Retail Prices in New York.

Anthracite

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$6 20	$6 40	$5 60
Lackawanna coal, delivered	6 75	7 00	6 25
Wilkes-Barre, "	7 00	7 25	6 75
Lehigh & Locust Mountain, del'd	7 00	7 50	6 50
Schuylkill Red Ash, del'd	7 00	7 50	

The Cost of delivering Pittston coal ranges from 40 cts. to $1 per ton, according to distance from the yard.

Williamsburgh, N. Y.

Lackawanna Coal at Yard.

Stove	$6 40
Egg	5 90
Chestnut	5 40

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$23 00
Liverpool House Cannel " " " "	25 00
American " " " " "	16 00
American Orrel " " " "	11 00
Red Bank Cannel " " " "	14 00
Cumberland " " " "	7 00

Baltimore, Md. Nov. 17, 1875.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth. White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 80	$4 05
Broken	5 55	5 40
Egg	5 92	5 77
Stove	6 17	6 02
Nut	4 97	5 10
Shamokin, (red or white ash), and "Boston," freeburning white ash,		
Egg	5 95	5 79
Stove	6 15	5 99
Lykens Valley, red ash,		
All sizes	6 55	6 37

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. $7 00@8 00.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point	4 15	4 50
West Virginia f. o. b. at Locust Point		5 50
Youghiogheny Gas, f. o. b. at Locust Point		5 50
Swanton Coal, George's Creek		4 40

Boston. Nov. 13, 1875.

Reported by our Special Correspondent.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 20	Westmoreland and Penn.	6 85
Caledonia	5 00	Waverly Co. Youghiogh'y.	6 80
Pictou	5 60	Cannelton Cannel	11 60
Block House	5 20	Cumberland	5 80@ 6 00
Red Bank Cannel	9 00	Anthracite	.6 50@ 7 25
Glace Bay	5 00	" retail	.7 50@ 8 00
Sydney	6 25		

Buffalo, N. Y. Nov. 17, 1875.

Reported by our Special Correspondent.

ANTHRACITE.

	Afloat. f.o.b.	Retail. Deliv'd.
Grate	$6 40	$7 40
Egg	6 40	7 40
Stove	6 85	7 85
Nut	6 60	7 60

	Lump.	Run of Mine.	Nut.	Slack.	Nut & Slack.
Connellsville Coke	$5 50	....	....	....	....
Brookfield Coal	....	....	....	....	....
Briar Hill	4 50	....	....	....	3 00
Youghiogheny	4 75	....	....	....	....
Monterey	3 75	3 50	3 25	2 50	....
Catfish	3 75	3 50	3 25	2 50	....
Stoneboro	....	....	3 25	2 50	....
Sterling Cannel	5 50	....	....	....	....
Buffalo Coal Co.	3 50	3 25	....	2 30	....
Cameron	....	3 25	....	....	....

Chicago, Ill. Nov. 15, 1875.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

Retail prices per ton of 2000 lb. delivered to buyer.

		BITUMINOUS.	
Lehigh Lump	$10 50	Briar Hill and Erie	@ 7 00
Lehigh grate and egg	10 50	Walnut Hill, Pa	@ 6 50
Lehigh stove and chest	11 00	Midway, Pa	@ 6 50
Lackawanna, Wilkes Barre and Pittston*		Cannel	@ 8 00
Grate and egg	9 50	Blossburg	7 50
Stove and chestnut	10 00	Indiana Block	6 00
		Hocking "Brooks"	6 50
		Wilmington and Illinois	5 00

* 50 cents off these prices for car load lots to country dealers and manufacturers.

Cincinnati, O. Nov. 13, 1875.

Reported by our Special Correspondents.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	10 c.	——
Pomeroy coal	8 c.	——
Kanawha "	10 c.	——
Cannel coal, according to quality	—	——
Semi-Cannel	—	——

The following are the retail prices delivered

Youghiogheny	15@16c.	$4 00
Pomeroy	11c.	3 00
Cannel	—c.	....
Kanawha Semi-Cannel	13c.	3 60
Anthracite	9 50@10 50	
Foundry coke	10c.	——
Coke, hard and soft	10c.	....

Cleveland, O. Nov. 17, 1875.

Specially reported by Messrs. WARNER, BATES & CO.

WHOLESALE.

Per ton of 2000 lb. f. o. b. vessels.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 40	$4 15
Cannel	4 50	4 15
Blossburgh	5 00	5 00
Briar Hill Block Coal	3 80	3 60
Hocking Valley	3 25	3 10
Straitsville Coal Co., lower vein	3 25	3 10
Massillon	3 10	3 30
Tuscarawas Valley	2 85	2 70
Columbiana	2 80	2 60

RETAIL DELIVERED.

	Lump.	Nut.
Briar Hill	$5 00	$3 50
Massillon	4 50	4 00
Mineral Ridge	4 50	4 00
Columbiana	3 25	3 00
Straitsville Coal Co., lower vein,	4 00	3 00
Tuscarawas Valley	3 25	3 00

ANTHRACITE DELIVERED.

	Grate.	Egg.	Stove.	Chestnut.
Lehigh	$9 00	$9 00	$9 50	$9 25
Wilkes-Barre	8 10	8 10	8 50	8 25
Lackawanna	8 10	8 10	8 50	8 25

Detroit, Mich. Nov. 13, 1875.

Specially reported by Messrs. ROBINSON & KEYS, Dealers in all kinds of coal.

Per ton of 2000 lb.

Lehigh Lump, per ton	$10 50	Blossburg	8 50
Lehigh " prep. sizes	10 00	Briar Hill	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank	7 00
Wilkes-Barre, Stove and Nut	9 50	Erie	50
		Massillon	7 00

Erie, Pa. Nov. 13, 1875.

Reported by our Special Correspondent.

Wholesale, per ton of 2000 lb. Bituminous f. o. b.

Briar Hill lump	$3 75	Beaver lump	$3 50
Midway	3 25	Cat Fish	3 00

Indianapolis, Ind. Nov. 13, 1875.

Specially reported by Messrs. COBB & BRANHAM

Wholesale on board cars, and retail delivered to consumers. Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

IndianCreek, per ton	$2 75	Peytona cannel, per ton.	7 00
White River, "	2 75	Indiana Cannel	0 50
Brazil Block, "	2 05	Hocking Valley	4 25
Highland, grate, "	2 25	Youghiogheny	4 75
Block coal, nut, per car.	18 00	Blossburg (smithing)	6 50
Highland " "	18 00	Piedmont "	6 50
Block Slack "	17 00	Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$9 95	Nut	9 80
Egg	9 95	Stove	10 25

Owing to the Miner's strike there is no Lehigh coal in this market.

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	14	" Slack, "	
Brazil Block	14	Peytona Cannel	6
Highland grate	14	Indiana "	24
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$10 per ton.
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Nov. 13, 1875.

Specially reported by Messrs. BYRNE & SPEED.

WHOLESALE.

	per bushel		per bushel
Pittsburgh	10c	Pine Hill	—
Raymond City	9c.	Kentucky	—

RETAIL.

	per bushel		per bushel
Pittsburgh	14c.	Peytona Cannel	20@22c.
Raymond City	13c.	Buckeye "	—
Pine Hill	13c.	City-made Coke	11c
Kentucky	12c.	Auth., per ton, $10 00 to 10 50	

Screened Pittsburgh per load	$3 00
Screened Raymond City	2 75
Pine Hill (Kentucky)	2 75
Cannel	$5 to 5 50

Milwaukee, Wis. Nov. 13, 1875.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail price per ton of 2000 lb.

Lehigh Lump	$10 00	Briar Hill, select	$8 00
Lehigh Prepared	11 00	Blossburgh	8 00
Lackawanna (all sizes)	10 02	Cannel	8 00
Pittston	10 00	Pittsburgh	7 00
Scranton	10 00	Steam coal	5 00

New Orleans, La. Nov. 13, 1875.

Specially reported by Messrs. P. & R. DE VERGES, Wholesale and Retail Dealers in Pittsburgh, Anthracite, Cannel and other Coals.

Pittsburgh coal, retail, per bbl	60c.
" wholesale	35c.
" steamboats, per box	50c.
" to manufacturers, per bbl	55c.
" shipments, per hhd	$6 00
Anthracite, wholesale, per ton	9 50
" retail, "	12 50
Virginia Cannel, per bbl	8.c.
Scotch " "	....
Mt. Carbon, wholesale, per bbl	...
" " retail, "	....
St. Bernard, wholesale, per bbl	....
" retail, "	....

Pittsburgh, Pa. Nov. 17, 1875.

COAL.—There is a very fair local and Western demand for bituminous, but in this as in every other branch of business it is complained that current rates afford little or no margin for profit; quotable at 5½@6c per bushel for lump, free on cars in Pittsburgh, and about a cent less for nut. The river was navigable for barges this week, and several light tows were started from this point; furthermore, it is probable those boats that were caught on the way on the last rise, will get through to their destination; the shipments from this point, however, were light, owing to scant water and rough weather. At Cincinnati, we understand, there has been quite a hitch between buyers and sellers; Pittsburgh operators were and are still holding their coal at 9c. afloat by the barge load, while buyers did not want to pay more than 8c. Anthracite coal is still quoted at $6.50 per ton on track and $7 delivered.

COKE.—No improvement to note in the coke trade, nor can it reasonably be excepted as long as pig iron continues in its present depressed condition. As long as the iron furnaces were in blast there was a steadily increasing demand for coke; it was being introduced into all parts of the country; furnacemen discovered that in addition to making a better quality of iron it cost but little more than coal. Hence as soon as the pig iron trade revives, we look for a largely increased consumption of coke, but at the present writing there is no disguising the fact that business is dull, it could not be otherwise. Prices are down to a point that affords the maker little or no profit; quotable at $2.50@2.75 per ton, deliverable free on cars in Pittsburgh.—*American Manufacturer.*

Richmond, Va. Nov. 13, 1875.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$12 00	New River Bituminous,	$4 50
" semi-Cannel	4 75	Clover Hill Coal	4 25
Coalburgh Splint	4 90	James River Bitum	3 30
Lewiston "	4 90	" " Carbonite,	5 80
Kanawha Gas coal	4 50		

San Francisco.

From the *Commercial Herald*, Nov. 4, 1875.

Imports from January 1st to Oct. 16:

Anthracite tons	9,047	English, tons	42,718
Australian, tons	101,220	Vancouver Island, tons	50,417
Coos Bay, tons	26,722	Rocky Mountain, tons	53
Cumberland, tons	8,530	Seattle, tons	46,075
Mt. Diablo, tons (8 mos)	109,712	Bellingham Bay, tons	8,545

The arrivals from Seattle are noteworthy and are steadily increasing, while other Coast mines north of us seem to be producing less than heretofore. The receipts during the week embrace the following: per *Young America* and *Northern Light* from New York, 236 and 150 tons respectively; 1,204 tons Seattle, per *Windward;* 1 200 tons Nanaimo, per *Emily Farnum*, from Departure Bay; from Boston, per *Star of Hope*, 144 hhds. and 100 tons; *Granger*, from Liverpool, 1,065 tons, etc. Wallsend cargoes may now be quoted at $8 50@9; Sydney, $8 50@9; Cumberland in bulk, $14@15; in casks, $16@18; Bellingham Bay, at $8 50; Coos Bay, $10; California Mt. Diablo Steam, $6 25@8 25 for fine and coarse respectively; English and Scotch Steam $9@10; Nanaimo, $9.50@10; Seattle, $9 25@10; Anthracite, $15@18. The *Abercarne* is at hand from Glasgow, with 609 tons Scotch.

Toronto, Ont. Nov. 13, 1875.

The following are present retail prices for coal:

Per ton all sizes.

Lackawanna and Scranton	$7 00
Lehigh Lump and prepared	8 00
Blossburgh	6 50
Soft lump for grates	6 00
Soft nut	4 50

Toledo, Ohio. Nov. 17, 1875.

Specially reported by Messrs. GOSLINE & BARBOUR.

Per ton of 2000 lb. on cars.

Hocking Valley	$3 40	Massillon	4 20
Straitsville	3 40	Youghiogheny	5 00
Shawnee	3 40	Blossburg	7 00@7 50
" nut	2 90	Cumberland	7 00@7 50
r Hill	5 50	Connellsville coke	7 00

ANTHRACITE.

Grate, screened	$7 50	Stove, screened	$7 75
Egg, "	7 50	Chestnut "	7 50
Lehigh Lump	9 00		

40 cents to $1 per ton additional for delivery at retail.

Halifax, N. S. Nov. 13, 1875.

Prices per ton of 2240 lb. in gold.

Sydney (old mines)	$4 00	Little Glace Bay	3 35
Gowrie	3 35	Blockhouse	3 35
Victoria	—	Albion (at Railroad)	4 00

Montreal. Nov. 13, 1875.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$6 00	Cape Breton Steam	$5 25
Pictou "	5 75	Newcastle Smiths,	7 00

Anthracite at retail, per 2000 lb., delivered.

Egg	$8 50	Chestnut	8 25
Stove	9 00		

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals.

per ton of 2240 lb.

	From Penn Haven.	From Mauch Chunk.	From Hazleton**		From Upper Lehigh.		From Ashley and Sugar Notch.
To ‡ Newark, N. J., via Central Railroad of New Jersey	2 60	2 46	2 93	2 93	3 16		
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	..	56	47	71		
‡ Philipsburg, N. J.	99	85	1 32	1 32	1 65		
Elizabethp't, Port Johnston, Hoboken and South Amboy, N. J., shipping and wharfage 35c. add.	2 24	2 10	2 59	2 57	2 80		
High Bridge, N. J.	2 40	1 95	2 80	2 54	2 72		
Somerville and Raritan, N. J	2 80	2 35	3 20	2 35	3 12		
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	2 60	2 46	2 95	2 93	3 16		
¶ Jersey City, N. J., and New York, via L. V. RR. and Morris Canal.	2 85	2 40	3 17	3 24	3 54		
Andover, via Delaware, Lackawanna and Western RR.	3 30	3 10	3 70	3 69	3 99		
Trenton, Somerset Junction and Greensburg, via P. RR. Belvidere Division	2 65	2 45	3 05	3 04	3 34		
Trenton, for shipment, including shipping and wharfage	2 71	1 95	2 45	2 46	2 76		

From *Mauch Chunk* to *New York* (towing limits) and Jersey City† via Lehigh Valley RR. and Morris Canal... $2 37

From *Mauch Chunk* to *Philadelphia* via L. V. RR. and North Penn. RR 1 75

††From *Phillipsburg, N. J.* to *Hoboken* for shipment via Delaware Lackawanna and Western RR., Morris and Essex Division 1 24

From *Lackawanna Junction* to *Auburn, N. Y.*, for shipment, via Southern Central R R. in connection with Pa. and N. Y. R.R. 2 53

From *Lackawanna Junction* to ‖*Weedsport* for *Rochester and Charlotte* 2 59

From *Lackawanna Junction* to *Sterling* for *Oswego, N.Y.*.. 2 62

‖ To this point for all places between Rochester and Buffalo the rate is 2 53

* The rate to this point for Syracuse is 2 00

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

§ Twenty cents per ton less when five cars at a time to one party. Provided that where the reduction makes the rate $1 a ton, or less, the rate will be $1.

¶ 20 cents per ton additional for transferring coal from boat to boat, and 30 cents per ton for reshipment of same from wharves.

† Transportation on Coal destined for re-shipment from this point is 20c. less than above rate.

†† The rate for consumption to this point is $1 80.

CANAL TOLLS, exclusive of towage, Bordentown to New Brunswick, when towed by the Company's Steam Tugs:

For Anthracite Coal ..... 34c.

Bituminous and Semi-bituminous Coal... 33c.

Freights.

Per ton of 2240 lb.

Representing the latest actual charters up to Nov. 19, 1875.

PORTS.	From Philadelphia.	From Baltimore and Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	2 40	....
Albany	*85	1 70	....
Amesbury, Mass	....	....	....
Bangor, Me	†2 00	2 50	1 75
Bath, Me	1 60	2 20	1 30
Baltimore	....	....	....
Boston, Mass	§2 25	2 20	1 50
Bridgeport, Ct	*85	1 65	90
Bristol, R. I.	....	....	90
Cambridgeport, Mass	§1 50@1 60	....	1 60
Derby	....	1 65	....
Dighton	....	1 70	....
East Cambridge	1 60§	....	§1 55
Fall River	1 50	1 65	90
Hackensack	....	....	....
Hallowell, Me	....	....	....
Hartford	1 95	2 50	1 40
Hoboken	†85	1 40	40
Hudson	....	1 65	....
Jersey City	....	1 40	40
Lynn, Mass	†2 10	....	†1 50
Middletown	....	....	1 15
Mystic	....	....	....
Newark	....	....	....
New Bedford	1 35	1 70	90
Newburyport	1 65	2 20	1 55
New Haven	*85	1 65	90
New London	1 60	1 65	95
Newport	1 60	1 65	90
New York	85††	‖1 40	40
Norfolk, Va	85	60	....
Norwalk	1 45‡	1 70	80
Norwich	1 50‡	1 85	90
Pawtucket	1 75‡	1 75	‡100
Philadelphia	....	80	....
Portland	1 95	2 20	1 50
Portsmouth, N. H.	2 05@2 10	2 25	1 65
Providence	1 50	1 65	90
Petersburg, Va	....	90	....
Portsmouth, Va	....	....	....
Poughkeepsie, N. Y.	*85	1 50	....
Richmond, Va.	1 00	70	....
Rockport	....	....	....
Saco	2 50	....	....
Sag Harbor	....	....	1 00
Salem, Mass	1 65	2 20	1 30
Salisbury Pt., Mass	....	....	1 50
Savannah, Ga	....	1 50	....
Stamford	*85	....	90
Stonington	....	....	....
Taunton	.. .	..	1 30
Trenton, N. J.	....	....	....
Troy	....	....	....
Warren, R. I.	....	....	90
Washington, D. C.	1 00	....	....
Wareham	....	1 75	....
Weymouth	....	2 25	....
Wilmington, Del	1 50	85	....
Wilmington, N. C.	....	1 50	....

* And discharging and towing. † And discharging.

‡ And towing. § 3c. per bridge extra.

‖ The rate to this point by barge is $1 70. †† Afloat.

From Philadelphia to all places on the Hudson River the rate is 85c., and discharging and towage according to destination.

Freight on Nova Scotia Coals.

Pictou, Nova Scotia, to		New York	$1 80
" " "		Portland, Me	2 00
" " "		Montreal, Canada	2 35
" " "		Quebec, "	1 80
" " "		Halifax, N. S.	1 25

Pilotage for vessels of from 80 to 150 tons, $6 inward and $4 outward. From 150 to 1000 tons. 10 to $17 inward and $6 to $12 outward. Vessels of 1000 tons and upwards, 2c. per ton inward and 1½c. per ton outward.

Towage 3c. per ton. Trimming 3 hatch vessels, 6c per ton. Two hatch vessels 7c. per ton.

Delaware and Raritan Canal.

Tolls and Steam Towage.

Per 2240 lb. Cargoes to exceed 110 tons.

From Fairmount	to	New York, towing limits	within 53d st.		74c.
" Greenwich	"		Bituminous		64c.
" "	"		Authracite		69c.
" Lambertville	"		Authracite		62c.
" Port Richmond	"		.....		68c.
" "	"		Semi-bituminous coal,		63c.
" Philadelphia	"		Cumberland	"	58c.
" Trenton	"		Anthracite	"	37c.

Towing.

From foot of 23d Street, East River, and *return*, *per ton.*

	cts.		cts.
Bridgeport, Conn	33⅓	New Haven and Norwalk, Conn	33½
Hartford and Stonington, Conn	75	New London, Conn	60
orwich, Conn	68	*Derby, "	3½
Stamford, Conn., per boat	$75	Harlem, N. Y, per boat.	$18
Whitestone, L. I.	$30	Glen Cove, L. I.	50

	cts.
Manhattanville, via Hudson River, per ton	8
Harverstraw and Peekskill, via Hudson River	16
West Point and Cold Spring " "	17
Rondout " "	23
Yonkers, boats of 100 tons capacity " " per boat.	$5
Sing Sing and Peekskill " " " "	20

* $50 per boat extra is charged for towage to this point.

Boats having less than 200 tons will be charged the same to Eastern points as if carrying that quantity.

Freights on Bituminous Coals from the Mines to Tide-Water Shipping Ports.

From the Mines to Cumberland and State Line (say an average of 20 miles) the charge is 3 cents per ton of 2240 lb. per mile.

From State Line to Amboy (346 miles) $3 75 per ton of 2000 lb. On coal shipped beyond this point there is a drawback of 50 cents per net ton.

From Cumberland to Baltimore (178 miles) $2 31 per ton of 2240 lb., or $2 02 per net ton, and 4 cents per gross ton for use of cars.

From Cumberland to Georgetown (152 miles) by canal, $1 15. Tolls, 51 cents.

From the Mines to Piedmont (from 4 to 10 miles) 5 cents per ton of 2240 lb. per mile on distances less than 5 miles, and 4 cents per ton per mile on distances not over 10 miles.

From Piedmont to Baltimore (206 miles) $2 69 per ton of 2240 lb., or $2 40 per net ton.

From any point in the Kanawha Valley to the James River wharves below Richmond, (say 350 miles) by C. and O. R.R., including terminal charges, per ton of 2240 lb. For Cannel coal, $4 50.

Do do., for Semi-Cannel or Splint, per ton of 2240 lb., subject to rebate on shipments of 5000 tons or more, $3 65.

From Irwin to W. Phila (say 332 miles) per P. R R. Penn. Westmoreland gas coal, per ton 2000 lb.....$4 75

From Oscoola to W. Phila (say 248 miles) per T. & C. R. R, per ton bituminous coal of 2000 lb., 6c. extra for cross roads. Drawbacks, according to destination of coal 3 55

From Fairmount and Clarksburg to Baltimore (say 300 miles) via B. & O. R. R. including loading, per 2000 lb 4 75

On through coal after deducting drawback..... ... .

From Richmond, Va., to New York, via vessel, 392 miles per 2240 lb.. 1 60

" " " *Boston,* about 650 " " " 2 00

" " " *Philadelphia,* 292 " " " 1 25

From the Mines to Richmond, via James River and Kanawha Canal, 15 miles..... 15

THE BRITISH COAL AND IRON TRADES.

LONDON, November 6, 1875.

THE IRON TRADE.

The iron trade of England and Wales is growing worse each day, and prices, as a rule, still show a downward inclination. The announcement that MESSRS. BOLCKOW, VAUGHEN & Co. will greatly curtail their operations on the 13th, inst. which announcement has been followed by similar ones from firms of less note, shows vividly the true condition of the iron trade, and has cast the greatest gloom over all; as it is quite evident that thousands of workmen must be without employment during the Winter months, while, from a lack of employment and scanty wages during the previous months of this year, many are ill prepared to meet such a fate. There is but a very limited demand for bars, plates, rails etc., with no indications of any early revival. A very fair amount of business, however, continues to be done at many of the Bessemer steel mills.

The following are the leading quotations of iron:

——	Tees, f.o.b.	Barrow, f.o.b.	Liverpool, on trucks.
No. 1 Pig	54/	*80/	70/6
No. 2 "	51/6	*77/6	
No. 3 "	49/	*75/	68/
No. 4 Forge.....	48	71/6	65/
Common Bars..	142/6@147/6		152/6@160
Rails.....	130/@135/		140/@145/

* Bessemer Pig.

Common bars in South Staffordshire. £8 and marked bars, £10—12/6 for Lord Dudley's. Iron rails in Wales £6 10/@£6 15, and bars £7.2/6 d @£7 7/6d. Steel rails, £9@£9 10/. Steel rails at Liverpool and on the East Coast, £9 10@£10 10/.

THE COAL TRADE.

There is a very good demand for house coals, but owing to the great depression in the iron and general manufacturing trades, the demand for manufacturing and furnace coals is very small and prices unremunerative. Tyne coals are quoted f. o. b. as follows: steam 10/6d. @14/; households, 11/@15/: and gas coals, 8/6d.@10/. Hetton gas coal f. o. b. Sunderland is quoted at 20/6d.; common steam coal f. o. b. Liverpool, 10; South Wales coals f. o. b. Cardiff, as follows: best double screened coal 12/9d.; colliery screened, 11/3/d @12/; household, 10/; coke, 146d./@16/.

THE CLEVELAND IRONMASTERS' ASSOCIATION RETURNS FOR OCTOBER.

The number of furnaces in blast on the 31st ult. was 114, and 45 out of blast. The make of pig iron for the month was 169,181 tons, or 9,254 more than in September. The shipments show a decrease of 9,941 tons as compared with October 1874. Makers' stocks on the 31st, ult., were 76,346 tons, an increase of 647 tons since September 30th.

THE LABOR MARKET.

MESSRS. BOLCKOW, VAUGHEN & Co., the most extensive iron-producing firm in the North-of-England, employing, at collieries, iron mines and iron works, about 10,000 men, have given notice to the whole of their men employed at Middlesbrough, Wilton Park, and Eston ironworks that, in consequence of great depression of trade all engagements will terminate on the 13th inst. Notice has been issued from the office of the Steam Collieries Defence Association, at Newcastle-on-Tyne, announcing a reduction of 20 per cent. off the present gross earnings of hewers, and 12½ per cent. off the gross earnings of all other classes of labor in and about the collieries.

FIRTH AND NORTH'S COAL-CUTTER.

The Judicial Committee of Privy Council, on Wednesday last, prolonged the patent for this invention for seven years. It was stated for the patentees that their machine, until recently, had been the great abhorence of the miners, who regarded it as a weapon and an excuse for taking away their livelihood, and in consequence the inventors, as they pleaded at the bar, had not had fair play in bringing their patent before mine-owners. hostility, however, had gradually abated during the last two years, and the inventors, who described themselves as being some thousands of pounds out of pocket, were in hope, now that the patent was prolonged, of recouping themselves for their labor and trouble.

SCOTLAND.

THE IRON TRADE.

There has been a much better business in both warrants and makers' irons, and prices show an advance. Warrants have ranged from 61/1 d. to 62/3d, and closed yesterday at 61/6d. Stocks in CONNAL & Co's stores are 70,215 tons, or 1,670 tons less than a week ago. The number of furnaces in blast is 116. The shipments for the week ending October 30, were 11,366 tons, 1 613 tons more than the previous week and 2 690 tons less than during the corresponding week of 1874. The imports of Middlesborough pigs show a falling off for the week, as compared with the corresponding week of 1874, of 2,210 tons, leaving the increase this year at 11,384 tons. Makers' brands of No. 1 iron are quoted as follows: Gartsherrie, 72/5d.; Coltness, 77/; Summerlee, 70/; Langloan, 75/; Carnbroe, 67/; Monkland, 63/; Glengarnock, 69/6d.; and Eglinton, 63/. Freights are as follows: To New York, 2/6d.; Boston, 14/; New Orleans, 5/; Baltimore, 8/; Philadelphia, 10/; and San Francisco, 27/6d. With the exception of the pipe founding branch, manufactured iron continues very dull.

THE COAL TRADE.

The coal trade is getting worse, and even house coals which were lately advanced 6d. per ton, are hardly maintained at the advanced figure. The wholesale prices are as follows: Household coals, 8/6d.@10/6d. per ton; Wishaw main, 7/3d.@7/9d.; steam, 8/9d.@10/; splint, 8/3d.@8/9d.; and smithy, 13/9d.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, NOV. 19, 1875.

American Pig.—There has been considerable pig iron sold during the past two weeks, and we are informed that it has all gone to consumptive account. There appears to be more inquiry for iron than there was several weeks ago; but whether this is caused simply by the approach of the close of navigation, the next four weeks will decide. There does not appear to be much of a speculative feeling in the market, although we are informed that $1000 has been offered for the right of accepting 20,000 tons of a first-class brand of No 1 iron, at $25 per ton, before the 1st of July, 1876. We are reported the following sales of Thomas iron: 1500 tons forge at $21; 500 tons of No. 1 foundry at $24; and 700 tons of No. 2 foundry at $22. Also from 2000 to 3000 tons of Musconetcong iron on private terms. There are rumors of a sale of 2000 tons of a good brand of No. 1 foundry at a price equal to $22, delivered at Hoboken, but we are unable to authenticate it, and it is not generally credited. Good brands of iron appear to be very firm at our quotations, although we are aware that concessions have been made on inferior brands. We quote No. 1 foundry at $24; No. 2, $22; and gray forge at $19@21

Scotch Pig. This article continues quite firm under the high rates in Glasgow and the limited stock here. The demand shows no improvement. We note the following sales, 200 tons of Coltness, at $33; 150 tons of Eglinton, at $29.50; and 100 tons of Glengarnock on private terms. We quote Coltness at $33; Eglinton $30; Glengarnock $32; and Gartsherrie $32,50.

Rails.—We are reported a sale of 3750 tons of 50 lb. rails for a Western road. We quote iron rails, at mills, at $45 and steel at $70.

Old Rails.—We learn of no transactions and quote nominally at $25 50@$26.

Scrap,—Without business we quote nominally at $31 @$32.

Baltimore. Nov. 17, 1875.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change of prices of iron to note since our last report, there has been rather more inquiry, particularly for car-wheel irons during the week, which is due to the near approach of close of navigation. We quote:

Baltimore Charcoal....	$32@35	Anthracite No. 3	$21@22
Virginia Charcoal.....	30@34	Mottled and White....	18@20
Anthracite No. 1.....	25@26	Charcoal C. B Blooms,	70@75
" No. 2.....	23@24	Refined Blooms.....	60@65

Boston. Nov. 13, 1875.

PIG is still in an unsatisfactory position. The decline at one or two of the leading furnaces seems to be authoritatively settled at $23 50@24 for No. 1. These are brands that have been known as prime or somewhat fancy. There is hardly business enough just now to warrant any show of competition, but still this market meets the spirit of primary points, and quote No. 1 at $25@26; No. 2 at $23 50@25; and gray forge at $20@23.

BAR is again very quiet. Prices of warranted bar have settled to $56, at which value job lots are offered. These low quotations attract some business, one outfit for a new ship to build on the Kennebeck in the winter having been engaged, with estimates out for four others. The lowest values are down to $55 50 cash, with a concession here and there of a trival item.

STEEL is doing fairly for sheet for both boiler and shoe shank purposes, at from 8¾ to 10c. while machinery, although a little irregular, is selling fairly. We quote American tool, 14@15c.; American machinery, 9@9½c.; Bessemer tires, 6¾@7¼; Sweet's Excelsior tire, 8½@12c.; English tool, 16@18c. gold.

COPPER has had a little more business consequent upon a disposition of holders to meet manufacturers' views, and sales at 23c. to run through the winter, and at 22½c. cash for spot have been reported. This spurt to sales has made all parties feel more cheerful, and the impressions of a steady market at 22c. for the next two months seems to be the theme of discussion. For manufacturers we quote new sheating, 30c; bolts and braziers, 31c.; yellow metal bolts, 20@29c.

LEAD remains very dull, with prices nominally as last quoted. We quote pig 5¾@5¾c. for domestic, and 6¼@6½c. for foreign; sheet and pipe lead 9c. currency; tin-lined pipe, 16½c.; bar lead, 9c. less usual trade or 10 per cent discount.

ANTIMONY is firm, with a small inquiry at 13½c.

SPELTER is strong and quiet at $7 45, 30 days, and $7 35, prompt cash, all currency. Silesian is having a trivial business at $7 30, gold.

TIN has had a small jobbing business at somewhat irregular prices, while invoice lots are quoting a trifle lower to induce trade. We make no change, however, in quotations. We quote Straits, 19¼c.; Banca, 24c.; Refined English, 19¾@20c. gold. Plates are active. We quote charcoal I. C., $7 25@7 75; coke, $6 50@6 75; and terne at $6 15@6 50, gold.—*Commercial Bulletin.*

Cincinnati. Nov. 16, 1875.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below please find the closing quotations of our pig iron market, viz:

CHARCOAL.			
Hanging Rock, No. 1 Foundry.....	$25 00@26 00	—4 mos	
" No 2, "	23 00@24 00	—4 mos	
" Mill	21 00@22 00	—4 mos	
Tennessee No. 1, Foundry..... ...	24 00@25 00	—4 mos	
Tennessee, No. 2, "	23 00@23 50	—4 mos	
" Mill	21 00@22 00	—4 mos	
Missouri, No. 1, Foundry.....	.... @	—4 mos	
STONE COAL.			
Ohio, No. 1, Foundry.....	23 00@24 00	—4 mos	
" No. 2, "	22 00@22 50	—4 mos	
Ohio Mill	21 00@21 50	—4 mos	
Missouri, No. 1 Foundry	27 00@28 00	—4 mos	
" No. 2, "	26 00@27 00	—4 mos	
" Mill	26 00@27 00	—4 mos	
CAR WHEELS.			
Hanging Rock, C. B	40 00@50 00	—4 mos	
Tennessee "	30 00@35 00	—4 mos	
Missouri "	35 00@40 00	—4 mos	
Alabama "	30 00@35 00	—4 mos	
BLOOMS.			
Charcoal.....	60 00@ 80 00	—cash	
SCRAP IRON.			
Cast.....	50c.@ 75	—cash	
Wrought.....	1 00@1 25	—cash	

Louisville. Nov. 16, 1875.

Specially reported by Messrs. GEORGE H. HULL & Co.

There is only a moderate demand for metal, and prices are without change. The usual time, four months, is allowed on the quotations below.

HOT BLAST—CHARCOAL.	
No. 1 foundry, from Hanging Rock Ores.....	$25 00@26 00
No. 2 " " "	23 00@24 00
No. 1, Mill, from " " "	—@—
No. 1. foundry, from Alabama, Georgia and Tennessee ores	23 00@24 00
No. 2, foundry, from Ala., Geor'a and Tenn. ores	22 00@23 00
No. 1, Mill, from " " " " "	21 00@22 00
HOT BLAST—STONE COAL AND COKE.	
No. 1, foundry, from Hanging Rock ores.....	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1, foundry, from Ala. Ga. and Tenn. ores..	23 00@24 00
No. 2, " " " "	22 00@23 00
No. 1, Mill, " " " "	21 00@22 00
No. 1 foundry, from Missouri ores.....	24 00@25 00
No. 2 foundry, from Missouri ores.....	24 00@25 00
No. 1 Mill, from Missouri ores	25 00@26 00
COLD BLAST—CHARCOAL.	
Car Wheel from Hanging Rock ores.....	35 00@40 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia ores.....	28 00@38 00
" " Kentucky ores.....	28 00@40 00

Pittsburgh. Nov. 17, 1875.

Specially reported by A. H. CHILDS, Esq.

The market remains in the same quiescent state that has characterized it for some weeks past.

Prices are nominally unchanged, but occasional lots are picked at something less than quotations, when owners' necessities compel a speedy sale.

No 1. foundry.....	$25 00@26 00	—4 mos
" 2. "	24 00@25 00	—4 mos
Gray forge	23 00@24 00	—4 mos
White and mottled.....	20 00@22 00	—4 mos
Hot blast charcoal.....	25 00@30 00	—4 mos
Cold blast charcoal.....	30 00@35 00	—4 mos

PIG IRON.—Wednesday, Nov. 17, 1875.—The pig iron trade continues in much the same condition noted from time to time for several weeks past. There has been no improvement in the demand, which is exceedingly small, confined entirely to supplying immediate necessities, and prices are weak, although without quotatable change. Common and inferior grades of mill iron are offering at low rates, and hard to sell just now at any price, while good standard brands, although lower than they were a month ago, are held with considerable tenacity; producers generally are refusing to make any further concessions, and besides, unless a very material reduction was offered, buyers could not be induced to take hold. Some of them have been buying more than they could use, because it looked cheap, but as a rule the same iron could have been bought for less money before it was used; par-

ticularly has this been true of charcoal irons, in which there has been a steady shrinkage going on for several months, and at the present writing they are down almost as low as coal and coke irons. There has been, as noted, in our last review, considerable activity in this kind of iron during the past couple of months, as it always gets the preference at anything near the cost of other irons, as is the case just now, and some buyers have anticipated future wants because they thought it was cheap and was not likely to go any lower; in this, however, they were mistaken, and the consequence is the demand has fallen. buyers being apprehensive that the lowest notch has not yet been reached. It is worthy of notice that in the view of recent failures, more caution is being exercised by sellers; buyers, of whom there is not the least shadow of a doubt financially, are no longer able to buy on credit, and unfortunately these good buyers do not want much iron. Thus, as will be seen, the outlook is unsatisfactory and unsettled.

QUOTATIONS

No 1 foundry	$25 00@$26 00	—4 mos.
No. 2 foundry	24 00@ 24 50	—4 mos.
Gray forge	23 00@ 24 00	—4 mos.
White and mottled	20 00@ 22 00	—4 mos.
Charcoal, mill	23 00@ 25 00	—4 mos.
No. 1 foundry	28 00@ 30 00	—4 mos.
Cold blast car wheel, Eastern	30 00@ 35 00	—4 mos.
" " " Hanging Rock	40 00@ 50 00	—4 mos.

MANUFACTURED IRON.—There is little to report in regard to the market for finished irons, that is really new or important; manufacturers generally continue to report trade as being both dull and unsatisfactory. Orders, from all that we can learn, are coming forward sparingly, which is not unusual at this season of the year, and prices, that is for nearly all the leading sizes and makes, are still reported unremunerative; while possibly there has been a quotable decline within the past few weeks, the tendency is toward still lower rates. It is true, the cost of production has been reduced, as both labor and the raw article are lower; but under the influence of an active competition, prices of the products have been lowered accordingly, so that the reduced cost of production has not been of much advantage to the manufacturer. Those mills having specialties, in which, as yet, there is not an over-production, are doing well enough, as they are enabled to sell the ordinary size at cost, or even a slight loss, but others, not having this advantage, who make nothing but the ordinary sizes, on which there is no margin for profit, are doing no good, and unless there is a change for the better, will soon be forced to shut down. The production has been curtailed considerably both here and elsewhere within the past few months, as quite a number of mills have been stopped, and this is about the only encouraging feature at the present time.

PIG METAL SALES REPORTED FOR THE AMERICAN MANUFACTURER FOR THE WEEK ENDING NOV. 17, 1875.

BITUMINOUS COAL OR COKE, SMELTED FROM L. S. ORE OR L. S. ORE AND NATIVE.

50 tons gray forge ..... $24 00—4 mos.
200 tons gray forge ..... 23 00—4 mos.

ANTHRACITE.

10 tons No. 1 foundry ..... $27 00—4 mos.
100 tons gray forge ..... 23 00—5 mos.

CHARCOAL.

	H. R.	P. T.
160 tons Nos. 1 and 2 foundry		

American Manufacturer.

Richmond, Va. Nov. 16, 1875.

Reported by ASA SNYDER, Esq.

Virginia Cold Blast Charcoal Pig Iron			$30 to $35
" Warm " "	" "		28 to 32
" " " Coke	" "	1 X	26 to 27
" " " "	" "	2 X	25 to 26
" " " "	" "	3	24 to 25
" Anthracite	1 X		27 to 29
" "	2 X		26 to 27

San Francisco, Cal.

From the *Commercial Herald*, of November 4, 1875.

The market continues sluggish for pig iron, with an excessive stock and and free imports daily arriving. The receipts for the period under review embrace a very full line of English bar, sheet, bundle, and other iron, etc., also 300 tons pig iron per *Beechwood*, from Liverpool; 500 tons same per *Borrowdale*; 450 tons ditto per *Western Shore*; the *Hilda Maria*, from Hamburg; *Dawn* from Callan, etc. We quote the range of the market for pig iron, $32 50@35 50 Tin plate is without movement, quotations nominal. The stock is thought to be large. The supply of Sydney tin is liberal with a limited demand; price, 22½c. Banca pig tin is held at 25@26c. The stock of yellow metal is not large. The market for American cast steel is well supplied. Sales of empty quicksilver flasks at $1 50 each.

St. Louis. Nov. 16, 1875.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market remains about as last reported. The demand is gradually falling off and prices are lower than ever. But few good sales are noted. We quote on 4 mos. time: same as last.

Mo. Stone Coal	No. 1 Fy.	$26@27	
" "	" 2	"24½@25	
"	" Gray Mill,	23½@24	
" Charcoal	No. 1, Fdy.	26@27	
" "	" 2, "	23½@24	
" "	Gray Mill,	23@24	
Tenn. "	No. 1, Fdy.	25@26	
" "	" 2, "	23@24	
" "	Gray Mill,	22@23	
" Coke,	No. 1, Fdy.	25@26	
" "	" 2, "	23@24	
" "	Gray Mill,	23@24	
H. R. Char.	No. 1, Fdy.	26@27	
" "	" 2, "	24@25	
" "	Gray Mill,	24@25	

Massillon iron, A No.	1.34@35	
" " B "	1.32@33	
" "	" 2.30@31	
Cold Bl. Car Wheel, Mo.	3.@35	
" " "	Tenn.	30@32
" " "	Ala.	30@32
" " "	H. R.	35@40
Mo. Charcoal Blooms		60@65
" Scrap "		60@65
" hammered Billets		80@90
Assorted Bar Iron		2.10@2.20
No. 1 Wrought Scrap		1c.
Heavy cast "		..¾c.
Light "		..½c.

METALS.

NEW YORK, FRIDAY EVENING, Nov. 19, 1875.

There is a fair jobbing business doing, and prices are generally firm London advices, however, show a weakness in prices in that market, which is supposed to result from a strong bear influence.

Gold Coin.—During the week past gold has ranged from 114⅛@115, and closed at 114⅜.

Bullion.—Fine silver bar is quoted at $1 23@1 24, gold, per ounce, and fine gold bar at par ($20 67 gold, per ounce,) to ⅛ per cent. premium.

Copper.—The business of the past week has been very limited, sales not aggregating over 200,000 lb., spot, at 23¼c.@23¾c. The asking price now is 23¾c The firmness in prices is the result of the Combination taking up the outside lots in the market. Manufacturers are only supplying pressing necessities, which do not appear to be great. By cable, to-day, Chili Bars were quoted at £71 10/ in London.

The stocks of copper at Havre, London, Swansea and Liverpool, and Chili produce afloat and chartered (as per mail advices on the 30th ult. were 32.600 tons, as compared with 30,141 at the same date in 1874, and 36,152 tons in 1873. The imports into England and France, this year, to 1st November, were 54,327 tons, as compared with 49,235 tons, for the corresponding period of 1874, and 45,190 tons in 1873. The deliveries for the same period were: 51,470 tons in 1875; 55,497 tons 1874; and 47,781 tons 1873. ERNEST W. S. MURRANT, ESQ., of London, under date of November 5, says: "Chili is in about the same position as last week, with buyers at £82, and sellers at £82 5/ to 82 10/, for cash, g. o. bs. The charters are not published at the moment of writing, but a rumor is afloat of their being about 1900 tons, which causes a rather firm feeling in the market; no great desire being apparent to either buy or sell. All that can be said of present rates is that they are moderate, and no considerable movement can be expected in either direction. The price of g. o. bs. for 1st November for 4 years, shows a fluctuation of £3 10/ per ton. The week's business was 700 tons g. o. bs., and named marks at £82 5/ to £83 10/ for cash.

Tin.—By cable, to-day, Straits was quoted at £83 10/, in London, or a decline of £2 10/ since our last. Owing to an interruption to the cable between Madras and Penang, there is no information being received from Malacca, although the latest was of such a nature that it should give much strength to Straits tin. There is no doubt that the advance in London last week, would have been maintained, and even increased, had it not been for the great bear movement in existence there and in Holland. The indications are that a reaction will set in soon, and holders on this side are very firm in their quotations, which are as follows: Straits and Refined, 19¾c. @20c., gold, per lb; L. & F., 19½c.@19¾c.; and Banca 24c. The business doing is entirely of a jobbing nature.

The total stocks of tin in London and Holland, and afloat, on the 1st of November, were 13,025 tons, against 11,320 tons at the same date in 1874, and 9,306 in 1873. The imports to November 1st were 19,871 tons in 1875; 15,100 tons in 1874; and 12,296 tons in 1873. The deliveries for the same period were: 17,235 tons in 1875; 14,334 in 1874; and 11,315 tons in 1873. Mr. MURRANT says: "A reference to the statistics to 1st November may not prove uninteresting. They show, on the nearest estimate practicable, a diminution in the totals, from which the available stocks are drawn, of about 1,150 tons against those of the corresponding period of 1874, when the price of Straits was £93 10/ per ton, and of about 220 tons, against those for 1873, when the quotation was £121 per ton. The gross total of stocks in London and Holland, on 1st November, compare as follows:

	1873. Tons.	1874. Tons.	1875. Tons.
	7,451	8,269	9,406
Straits per ton	£121 0 0	£93 10 0	£85 10 0

So that an increase of 1,955 tons in the total European stocks in two years has effected a reduction in values of £35 10/ per ton. The transactions of the week comprised 180 tons of Straits, and 25 tons of Australian at 81/6 to 85/6, for cash and prompt."

Tin Plates.—A fair jobbing business is doing at the following quotations: Charcoal tins, $7 25@$7 37½ gold per box, and ternes, $6 87½@$7; coke tins, $6 25@$6 50 and ternes, $6@$6 25.

Messrs. ROBERT CROOKS, of Liverpool, under date of November 4, says: "A pretty large business was done at the beginning of last month, which stiffened prices and put another 6d. on prices generally. Most makers are as full of orders as they care to be for this month and next, unless they can get advanced prices, which buyers will not pay. The market may now be considered dull, as there is little buying going on. We quote E. C. C., 27/ 6d.; R. G., 26/ 6d.; Ynis, 25/ 6d.; Monnow, 25/ 6d.; Siluria, 25/; P. N., 25/ 6d.; Ternes, R. G., 23/ 6d.; S. T. P. Dean, Allaway, 23/ 3d.; coke tins, Asyami, 21/; Dunvant, 22/; Gelly, 21/ 9d.; Oldcastle, 23/; Deri, 22/; Flint, 21/ 9d. Ternes, 1/ 6d. less. The exports from Liverpool for October, were: to Canada, 3,811 boxes in 1875, and 8,709 boxes in 1874; to New York, 39.771 boxes in 1875, and 84,999 boxes in 1874; to Boston, 15,516 boxes in 1875, and 11,730 boxes in 1874: to Philadelphia, 21,590 boxes in 1875, and 16,089 in 1874; to Baltimore, 6,000 boxes in 1875, and 3430 boxes in 1874."

Lead.—During the week it became known that 600 tons of ordinary Richmond lead was sold last week at 5½c. gold. Since then there have been sold 200 tons of refined Richmond, at 5.90c. and 700 tons of other brands of ordinary lead at 5¾c.@5 95c. These purchases have been made with the belief that the article had reached the lowest point, and not to supply pressing necessities. The market is now quoted at 5.95c.@6c. gold for ordinary brands. Soft Missouri is quoted at 7¾c. currency, and ordinary at 6.30.@6.50. currency.

Spelter and Zinc.—Domestic spelter is quiet at 7.40c. currency, with no lots outside of the Combination offering at less. 75 tons of Silesian have sold at 7.15c.@7.40c. gold. Sheet zinc is firm at 9c. gold.

Antimony.—With a moderate business doing is quoted at 14c. gold, per lb.

Quicksilver is quoted at £10, per flask of 75, in London; 70c., gold, per lb., in this city; and 65c. in San Francisco. The market is very much unsettled and prices nominal.

The San Francisco *Commercial Herald* of November 4, says: Advices from London by cable give £11 10/ as the price per bottle—with us the price has been reduced to 65c., 67½@70c. according to quantity and terms of payment. Exports for the week embrace about 1 500 flasks to China and Japan per *City of Tokio*. We submit the following items from London: The stock of quicksilver held in London, September 28th, by the Rothschilds was 3,400 flasks. No Austrain and but little Italian (300 flasks) Average consumption for export and home use, 3,500 flasks per month. Borneo all goes direct to China at present, say 2,000 flasks annually. The production in 1874 was 36,000 flasks Spanish, 8,000 flasks Austrain, 2,600 flacks Italian. The production in California for the month of October exceeds 5,000 flasks. The consumption per month in the Nevada mines is placed at 1,200 flasks, but of course there is some diminution at present by reason of the late fire.

FINANCIAL.

New York Stocks.

FRIDAY, Nov. 19, 1875.

We note an improvement in the quotations of a majority of the stocks dealt in on the New York Stock Market, with an increase in transactions of some 3000 shares. The shares of the Delaware, Lackawanna & Western R.R. Co. have advanced nearly 2 per cent. during the week, with increased sales. This company will pay the Nov. coupons of the Lackawanna and Bloomsburgh RR., on presentation at their office. N. J. C. R.R. is steady. The stock of the Quicksilver Mining Co has been very active during the week, with quotations slightly lower.

The October earnings of the St. Louis and Iron Mountain R.R show an increase of $26,910 over the earnings for the same month last year, and for the year up to Nov. 1st, 1875, an increase of $316,400 is reported over the earnings for the first ten months of 1874. The bonds of this company have been fairly active during the week at improved figures.

One thousand dollars of the Delaware and Hudson Canal reg. bonds, due in 1884, were sold at auction during the week at 110; also $2000 of the convt. 7 per cent. reg. bonds, of the N. J. C. R.R. Co., at 105¼.

The receiver of the Peekskill Iron and Mining Co. expects to sell the property in a short time for the benefit of the bondholders. The bonds and mortgages on the property amount to $350,000, which the proceeds from the sale of the property will just about cover. Other liabilities of the company amount to $163,000, so that the creditors will get nothing.

The forty-ninth annual report of the Baltimore and Ohio R.R. Co. was submitted to the stockholders at their annual meeting at Camden Station, on the 15th inst. For the fiscal year ending September 30, 1875, the total revenues of the main road and branches were shown to be $14,426,552.27, a decrease of $520,538.15, or something over 3½ per cent. from their revenues for the same period in 1874. The exhibit of the company's coal tonnage for the year is not so satisfactory, being given at 1,972,087 tons, or a decrease of 258.739 tons or about 13½ per cent. from 1874.

Quotations and Sales of Stocks and Bonds,

For the week ending Nov. 19, 1875.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	275	—
Consolidation Coal Co	48	46½	46½	100
Spring Mt. Coal Co	—	—	65	—
American Coal Co	—	—	48	—
Maryland Coal Co	20	17	17½	205
Del., Lack., and West. RR. Co	120	117⅞	120	3209
New Jersey Central RR. Co	105½	104¾	105	1950
Delaware and Hudson Canal Co	121½	120½	121¼	304
Quicksilver Mining Co. pref'd	23½	23	23	1200
" " " Common	18	17⅝	17⅝	700
Mariposa Land & Min. Co. various	—	—	7	100
St. Louis & Iron Mountain RR	15	13	13	200
Lehigh & Wilkes-Barre Coal Co	—	—	—	—
Total Shares sold				7974
Sales for the week previous				5252
Increase				2722

BONDS.

	Sales.	Price	
Ches & O. R. R. 6s, 1st. coupon	3,000	—	@ 31½
" " " ex coupon	1,000	—	@ 25
Central RR. of N. J. 1st Mtg. N	20,000	111¾	@113
" " " 1st Cons	1,000	—	@107¼
" " " Convt	10,000	105	@105⅛

Del. and H. Canal, 1st Mtg. '94	10,000	.....	——	@107½
" " 7s, '84	5,000	.....	110⅞	@111
" " Reg. '91	——	.....	——	@112½
Del., Lack. & W. R. R., 7s, conv.	——	.....	——	@†120½
" " " " 2d Mtg.	4,000	.....	——	@113¾
St. Louis & Iron Mount'n 1st Mtg	8,000	.....	92	@ 92½
St. Louis & Iron M'tn. 2d Mtg.	——	.....	——	@ 56†
Lehigh & Wilkes-Barre Cons.	3,000	.....	——	@ 96

Total Sales $62,000

Closing quotations, in the absence of sales, represent the latest prices bid.

† Asked.

Philadelphia Stocks.

PHILADELPHIA, Nov. 19, 1875.

The Philadelphia stock market has been very dull during the week, the tendency of the list with the exception of a slight fractional advance in the shares of the Reading R. R.) is toward lower figures with no alterations in prices worthy of note.

At auction on the 17th inst., the following were sold at the prices annexed—28 shares of the Crane Iron Company at 46 and 32 shares of the Philadelphia Canal Company (par 50) at 13.

Bonds exhibit a slight improvement in quotations under limited dealings.

The annual meeting of the Stockholders of the McElheny Oil Company will be held at their office in this city on Dec. 7th.

Quotations and Sales of Stocks and Bonds,

For the week ending Nov. 19, 1875.

STOCKS.

	Highest	Lowest	Closing	Shr's
Lehigh Valley RR. Co	62¾	62	62	746
Pennsylvania RR.	50⅞	50⅜	50¾	19550
Reading RR.	55⅞	55⅝	55¾	1865
Lehigh Coal and Nav. Co	51⅛	50⅞	51⅛	2951
Penn. Canal	—	—	9	28
Buck Mountain Coal Co.	—	—	—	—
Fulton Coal Co	—	—	3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co.	—	—	80	—
St. Nicholas Coal Co.	—	—	1	—
Cambria Iron Co	—	—	16	775
Crane Iron Co	—	—	46	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	78	77	77	137

Total shares sold 26,062
Sales for the week previous 78,603
Decrease 52,541

BONDS.

	Sales.	Price
H and B. T. RR. 1st mortgage, 7s	——	—— @104
" " " 2d " "	——	—— @102½
" " " 3d " cons	7,000	55 @ 55¼
Lehigh Valley RR. Con. mtg. 6s, Reg	8,000	99½@ 99¾
" " " 7s, 1910	2,000	109¼@109⅜
" " " 6s reg.	——	—— @106
Pennsylvania RR., 1st mtge. 6s	7,000	105 @105½
" " gen. " cou. 1910	7,000	—— @102
" " gen. " 6s, reg.	4,000	—— @102
Phil. & Reading RR. 6s,	——	—— @100
" " deb. bonds,	8,000	—— @ 81½
" " " G. M. 7s, cou. 1911,	1,000	—— @109¼
" " " " 7s, Reg	1,000	—— @109¼
" " new convertible 7s, '93	2,300	108¾@109
Phil. & Reading C. & I. Co. 7s deb. '92	——	—— @ 82
" " " 6s Helf. Tract	6,000	—— @ 89
Lehigh Coal & Nav. Co., 6s '84	1,000	—— @102
" " " RR., '97	——	—— @101¾
" " " '97	——	—— @ 98
" " " gold, '97	7,000	104¼@105⅛
" " " Reg.	——	—— @——
Penn. Canal, 6s	——	—— @ 70
Penn. and N. Y. Canal, 7s	5,000	—— @108
Ches. and Del. Canal, 6s	——	—— @ 88
Susquehanna Coal Co. 7s	——	—— @ 70
Buck. Mount Coal Co. 6s	——	—— @ 97½
Penn. Gas Coal Co. 6s	——	—— @100¼

Total amount of sales $66,300

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks,

NEW YORK, Nov. 19, 1875.

The San Francisco money market is reported as very stringent and cash gold is hard to obtain. The rate of interest is increasing and very irregular. This condition is attributed to the action of the Bank of California, which has been realizing on its assets and calling in loans; by the sudden requirements of the insurance companies for money to send to Virginia City for payment of losses there (the total loss of the insurance companies by the fire, amounts to $2,007,200), and by the constant shipments of gold to New York by the San Francisco merchants for sale at the high prices lately ruling here.

This condition of the money market has its effect in the depression of stocks, which, with a single exception, exhibit a general decline from quotations in our last. The bullion shipments of the Consolidated Virginia mine for the month up to the 1st inst., amounted to $1,531,800. After the fire 90 000 in bullion were found in the ruins of the Consolidated Virginia mill.

The C. & C. joint shaft is 800 feet deep; the new engines work satisfactorily, and run steadily through the day and night. Drifts and winzes are being pushed on the 1,500 foot level of the California, and continue to expose new rich ore; water is increasing about one foot per day.

The Trustees of the Raymond & Ely Mining Company have levied their fifth assessment of $3 per share, amounting to $90,000, delinquent in the board December 5th, and at the office December 14th. This stock shows a decline of nearly 50 per cent. within the last two weeks.

The Hale and Norcross Mining Company, has levied an assessment of $5 per share, delinquent December 11th, and the Imperial Mining Company, one of $1 per share, delinquent December 14th.

MINING NOTES.

The *Commercial Herald* states "The Gold Cañon region of the Nevada mines is assuming considerable importance, and we would not be suprised to see a bonanza uncovered in that cluster of mines of which Justice now seems to be the most prominent. This stock is quoted at from $25 to $30 per share. The field of operations is extending in every direction, and the new processes now under the most rigid tests are likely to revive regions that have been long neglected, but which are rich in the precious metals—in fact, their richness exceeds any former developments, but the rebellious character of the rock has been one great draw back of successful treatment."

The Richmond Cons. Mining Company, at Eureka, Nevada, shipped in October refined bullion to the amount of $120,831 47. The lead unshipped amounts to about one-fourth the above sum. The stock of this mine is principally held abroad; the last dividend declared by the company was in May of this year.

During the month of October the Manhattan Silver Mining Company shipped through WELLS, FARGO & Co. thirteen bars of bullion, weighing 9,721 pounds, and valued at $36,541 72.

The Denver (Col.) Stock Board has now been in existence five months, and, in spite of the opposition encountered, is an assured success. The sales during the week ending October 24th, were as follows: East Roe—495 shares at $8 15; 400 do at $8 50, seller 45; Hercules and Seven-Thirty Consolidated—1490 shares at $5; Victoria—978 shares at $5.

The following new Colorado Mining Companies were lately organized:—Phil. Sheridan and Gillespie Mining Company, Boulder County; Humboldt Silver Mining Company, Fremont County; Point of Rocks Mining, Milling and Tunneling Company, Boulder County; Argentine Mining Company, Summit County; Gold Hill Mining Company, Boulder County.

The El Dorado Mining Company was organized on the 6th instant, with a capital of $5 248,000, to operate in Lower California.

The National Gold Bank and the Exchange Bank have each declared a monthly dividend of one per cent.

The treasure exports for the first nine months of 1875 are nearly $12,000,000 in excess of those for the same period in 1874.

QUOTATIONS:

	No. of shares.	Nov. 10.	Nov. 17.
Sierra Nevada	100,000	$13	11
Union Consolidated	100,000	8	8
Mexican	108,000	17	16
Ophir	108,000	41	39
California	540.000	57	54
Consolidated Virginia	108,000	259	256
Best & Belcher	100,800	38	36
Gould & Curry	108,000	16	15
Savage	16,000	75	65
Hale and Norcross	16,000	36	30
Chollar Potosi	28,000	61	58
Alpha Consolidated	30,000	17	16
Imperial	100,000	9	8
Yellow Jacket	24,000	72	67
Kentuck	30,000	14	12
Crown Point	100,000	31	28
Belcher	104,000	21	19
Overman	38,400	46	45
Caledonia	20,000	14	14
Raymond & Ely	30,000	18	16
Meadow Valley	60,000	4	3
Eureka Consolidated	50,000	11	14
Eureka G. Y.	20,000	—	6

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, room 7 Traveller Building, 31 State street, Boston.

BOSTON, Thursday Evening, Nov. 18.

The market shows a little better feeling in copper stocks.

Allouez is unchanged. Their product for October was 85 tons.

Calumet is a shade stronger, probably on account of the firmness in Ingot Copper. There has been a marked advance in Duncan Silver from 75 to 1.10, closing at 1.05 bid. The mine is reported to be looking better. There is also a rumor that private dispatches have been read in regard to it, at the office, but not for inspection of shareholders however. Quincy is stronger at 43 bid. Last month's product was some 20 tons less than the corresponding month, last year, to the contrary notwithstanding. Eastern has fluctuated between 22 and 15† and closes at 15¾—16. Copper 23⅜ - 23½.

DESCRIPTION.	Par Value.	No. of Shares	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$ 13¾	$14¼
Calumet and Hecla	50	80,000	161¾	162
Central	25	20 000	33 50	34 00
Copper Falls	25	20,000	7 00	7 25
Dana	25	20,000	15	17
Duncan Silver	20	60,000	105	110
Franklin	25	20,000	12 25	12 75
Humboldt	25	20.000	20	25
Madisca	25	20,000	25	30
Mesnard	25	20,000	50	55
Minnesota	25	20,000	2⅛	2⅜
National	15	20,000	2 37	2 50
Petherick	25	20,000	50	60
Pewabic	25	20,000	4¾	5¼
Phenix	25	20,000		
Quincy	25	20,000	43 00	43 25
Ridge	25	20,000	6⅛	6⅝
Rockland	25	20,000	⅛	⅜
Silver Islet	—	—	—	—
Star	25	20,000	25	35
Superior	25	20,000	17	20
Eastern RR.			15⅛	15⅞

Gas Stocks.

NEW YORK, Nov. 19, 1875.

Gas stocks have been very quiet during the past week, quotations show but few changes, the list being slightly irregular with the majority of alterations towards lower figures.

We note the following sales at auction during the week at the figures annexed: $1920 of the scrip certificate of the Metropolitan Gas Company, of New York, at 105¾; also $1.000 of the scrip certificates of the Nassau Gas Company, of Brooklyn, at 101¼; and 2 shares of the Metropolitan Gas Company of the same place, par $100, @106 each.

The Monongahela City Gas Company of Pennsylvania, has declared a dividend of 2½ per cent. on the capital stock of that Company, payable on demand.

The Alleghany Gas Company of Pennsylvania, paid their stockholders a dividend of $1 per share Nov. 15th.

The San Francisco Gas Company, have declared their usual monthly dividend of ¾ per cent. The stock of this Company has been very quiet during the week, ruling steady at 95.

The following list is corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity.	Cap. Stk.	Par.	last Div.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.	$5,000,000	$ 100	2½	Oct. '75	107	107½
" " Bonds	900,00	1.000	3½	Aug. "	104	105¼
NewYork, "	4,000,000		5	Nov. "	150	151
Metropol. "	2,500,000	100	5	Sept. "	159	160
" " Certf.	1,000,000	...	3½	" "	106	107
" " Bonds	500,000	1,000	3½	July, "	104	
Harlem "	1.850,000	50	4	Aug. "	138	140
Manhattan"	4,000,000	50	5	July, "	310	315
Brooklyn, B'klyn	2,000,000	25	5	Nov. "	250	
Nassau "	1,000,000	20	4	July, "	135	
" " Certf.	700,000	1,000	3½	Nov. "	101½	102½
People's "	1,000,000	10	3½	July, "	101½	102¼
" " Certf.	300,000	1,000	3½	July, "	95	97½
" " 1ds.	325,000	....	3½	Aug. "	97½	100
Metropol. "	1,000.000	10	3½	May, "	106	108
Wmsburgh "	1,000,000	50	5	July, "	145	
" " Certf.	1,000,000	....	3½	July, "	102	
Citizen's "	1,200,000	20	2½	Oct. "	150	153
" " Certf	320,000	1,000	3½	Oct. "	101½	102¾
J. C. & Hob'n. N. J.	386,000	20	5	July, "	160	170
Westchest. Co. N. Y.	466,000	50	4	July, "	100	105

† Gold.

Companies out of Town.*	Cap. Stk.	Par	Bid	Askd.
People's " " of J. C.			130	
Citizen's G. L. Co., Newark, N. J.				65
Hempstead" " L. I., N. Y.	40,000	100		100
Jamaica, " " " "	25 000	100		100
Richmond Co., S. I. "	300,000		100	105
Citizens', Rochester, "		100	50	65
People's G. L. Co. Albany,"	1,000,000	100		60
Mutual " Buffalo "	750,000	100	50	
Troy G. L. Co., Troy, N. Y.			108	
Brockport, N. Y., G. L. Co.	25,000	100		90
Baltimore G. L. Co., Balt., Md.	2,000,000	100	175	
People's G. L. Co., Balt., Md	2,000,000	25		26⅞
Hannibal G. L. Co., Hanni., Mo.	100,000	100	90	
Lewiston G. L. Co., Lewis., Me	400,000	100		75
Chicago G. L. Co., Chicago, Ill.	2,000,000	100	140	
Jacksonville, Ill.	120,000	100	100	
Lima, Ohio	30 000	100	10	
Derby G. L. Co., Derby, Conn.	160,000	100		80
Woonskt G. L. Co. Woonskt, R. I.	150,000	100	100	
Fort Wayne G. L. Co. F. W., Ind		100		105
North. Liberties G. L. Co. Phila.		25	29½	
Wilkes-Barre G. L. Co W. B. Pa.		50	70	
Washington G. L. Co., Phila.			42	43
Portland G. L. Co. Portland, Me	350,000	50	72	75
Hartford G. L. Co., Hartford, Ct	700,000	25	44½	
Boston G. L. Co., Boston, Mass.	2,500,000	500	775	780
Chelsea G. L. Co. Chelsea, "	300,000		139	
Cambridge G. L. Co., Cam., "	700,000		132¾	
Louisville G. L. Co., Louis., Ky.			127	
Cincinnati G. L Co, Cincin, O.			202	
S. F. G.L. Co. San Francisco, Cal			95	
City G. L. Co. Montreal, Canada	1,440,000	40	126½	129
Consumers G. L. (old.) Tor., Ont	600,000	50	129	
Halifax G. L. Co., Halifax, N. S.		40	150	

* These quotations represent the latest obtainable prices at which sales were made.

American Mines in London.

DIVIDEND MINES.

CLOSING PRICES—Nov. 6, 4 P. M.

No. of Shares.	MINES.	Par Value of Shares	Bid.	Total Dividends paid.	Last paid.
		£	£	£ s. d.	
10,000	Battle Mountain, c. (6240 sh.) part paid	5	....	0 10 0	Nov. 1872
15,000	Birdseye Creek. g. Cal.	4	1¾	0 14 0	June, 1874
40,000	Cedar Creek. g. Cal.	5	¾	0 5 0	June, 1873
15,000	Chicago s. Utah	10	4	1 12 0	May 1875
21,000	ColoradoTerrible, s.-l. Col †	5	2	0 13 6	Jan. 1875
23,500	Eberhardt&Aur'a, s. Nev.†	10	8¼	1 0 0	July, 1871
60,000	Emma, g. s. Utah (35,000 shares part paid	20	1	3 12 0	Dec. 1872
15,000	Ferguson, g. Cal.	2	....	0 3 0	Ap'l, 1872
30,000	Flagstaff, s. Utah	10	⅝	4 2 0	July, 1873
30,000	Gold Run, hydr, Cal.	1	¾	0 2 4	Oct., 1872
20,000	Last Chance, s Utah	5	⅜	0 14 0	July, 1873
65,000	London & California, g.†	2	⅛	0 1 0	July, 1875
15,000	Mammoth Cop.c. s. Utah	10	....	0 5 0	Dec., 1872
5,000	Mountain Chief, s. Utah.	10	....	0 4 0	Jan., 1873
54,000	Richmond Cons. s. Nev.	5	6¼	2 14 0	May, 1875
125,000	Sierra Buttes, g. Cal.†	2	1	1 14 0	July 1875

60,000	South Aurora, s. Nev.	5	8/	0	14	2	Nov., 1873
15,000	Sweetland Creek, g. Cal. †	4	2	3	0	0	Sept. 1875
20,000	Tolima, g. s. (14,000 sh., £4/10 pd)	5	3	0	11	6	May, 1874

c. copper ; g. gold ; s. silver; s.-l. silver-lead ; † Quoted on the London Stock Exchange. All of the above are Limited Liability Companies.

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For determining the per cent. of Sulphur and Phosphorus in Iron or Steel	14 00
For each additional constituent of usual occurrence	6 00
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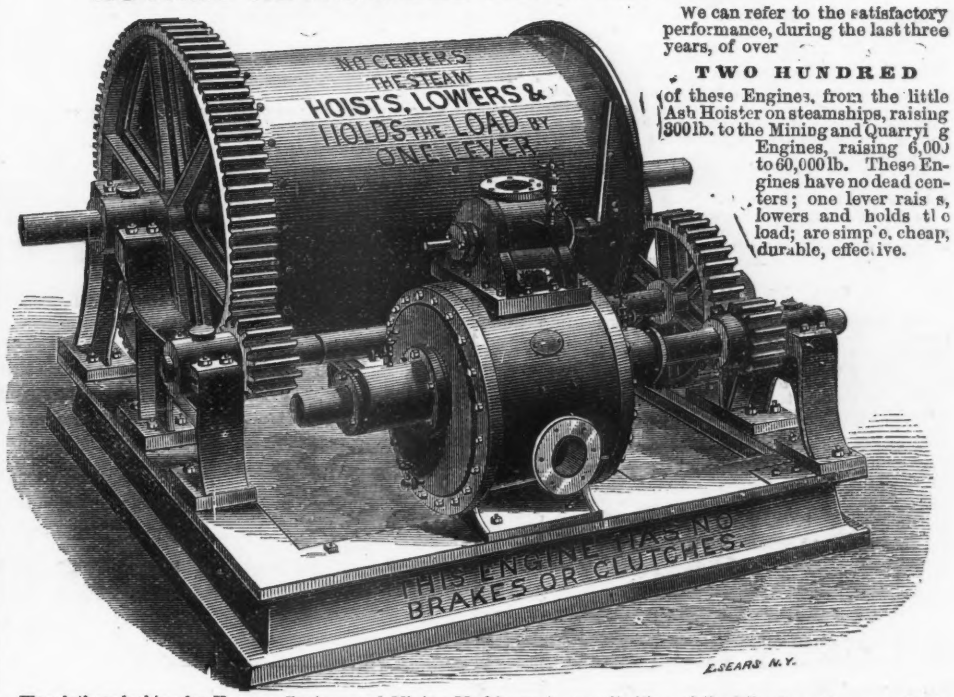

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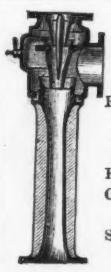

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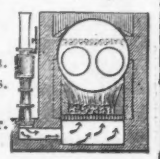

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Manager Chicago S. M. Co. (limited.)

Supt. Office EMMA HILL CONSOLIDATED M. Co.
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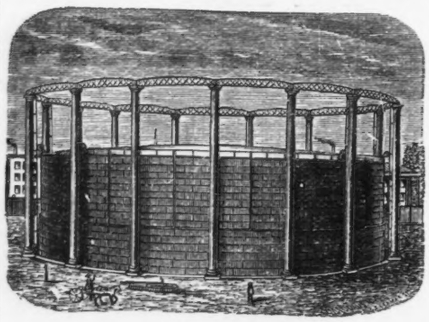

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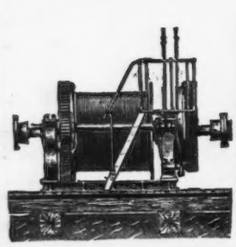

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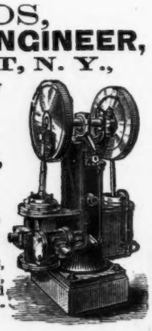

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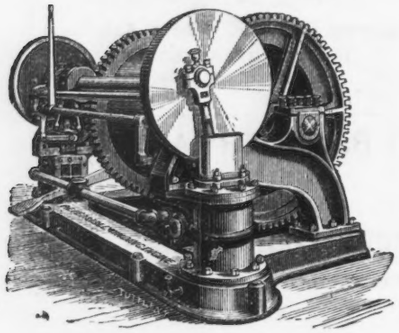

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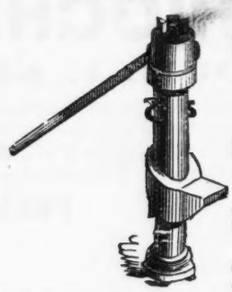

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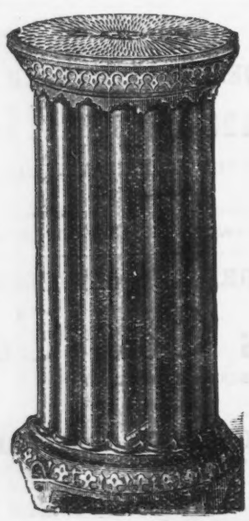

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